



FRIDAY, DEC. 26.

CONTENTS.

PAGE.	PAGE.
ILLUSTRATIONS:	NEW PUBLICATIONS..... 898
Profile and Arrangements of Lap Sidings—Cleveland & Pittsburgh R. R. 888	GENERAL NEWS:
Passenger Station of the Mich- igan Central R. R. at Bay City..... 890	Locomotive Building..... 900
The Gold Car-Heating System with Compound Double Coil 891	Car Building..... 900
Heavy Planer and Smoother... 893	Bridge Building..... 900
CONTRIBUTIONS:	Meetings and Announcements 901
English and American Passen- ger Rates..... 887	Personal..... 902
Uniformity in Safety..... 887	Elections and Appointments... 902
Some New Light on a Recent Accident..... 887	Railroad Construction..... 902
Trestle Bridge Floors..... 887	General Railroad News..... 903
Air Resistance at Very High Velocities..... 887	Traffic..... 904
Eliminating the Possibility of Accidents..... 888	MISCELLANEOUS:
EDITORIALS:	Technical..... 899
Uniform Classification..... 896	Railroad Law..... 900
The Economy of Safety..... 896	The Scrap Heap..... 900
Nominal Rates and Actual Earnings..... 897	Indian Railroad Notes..... 889
November Accidents..... 897	The Census of the Lake Coun- teries..... 889
EDITORIAL NOTES..... 896-897	Brake Rigging: Its Care and Operation..... 890
	Switching Problems..... 892
	Train Accidents in the United States in November..... 893
	Best Form and Application of Driving Wheel Brakes..... 894
	The Affairs of the Am. Soc. C. E..... 895
	Crosscutting Timber..... 895
	The Standard Code on the Chesapeake & Ohio..... 898
	The Brooklyn Bridge Problem 899

Contributions.

English and American Passenger Rates.

NEW YORK, Dec. 6, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The editorials and correspondence upon above subject have interested me. I digress at first to express my wonder that so many clergymen seem inclined to pose as authorities, lecturers and writers on the railroad problem—not always with good results. Why should Dr. Behrends lecture on passenger fares? Why should Dr. Edward Everett Hale attempt to cite the good success of receivers as business managers in his advocacy of national ownership of railroads, when it appears that he forgot that receivers do not pay bonded interest, whereas owners must? And now the editor of the *Century*, a literary magazine, prints his opinions of the Hungarian zone tariff, with a lot of stuff about the fares from New York to Chicago if the Hungarian plan were in vogue here; ignoring of course all the differences of detail in his comparison. Does the *Century* editor pretend to deliver expert opinions on other professional subjects?

But that is not what I started to say. I have not noticed in the English and American passenger fare discussion any reference to Pullman charges. Should they not be considered? That is, in comparing first-class fares in England and America, ought we not to add drawing-room fares to our charge? Twenty-eight dollars, New York and Chicago, figures out about three cents per mile instead of about two cents per mile on ordinary trains. The English four cents per mile first class includes drawing-room accommodations. Aside from the comparison of averages, which as you say in the absence of precise English information can be only approximate, the matter of including drawing-room charges would seem to raise our American average and in so far confirm your statement that the difference between English and American passenger fares in general is not very great.

READER.

Uniformity is Safety.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the time draws nigh when Congress will act on the matter of safety for railroad men the more I am impressed by the great magnitude and importance of the subject. A mistake in legislation means not only large costs to railroad companies but continued danger and exposure to the men.

The one supreme object to be arrived at of course is safety. Can this be secured if there be a multiplicity, say, of automatic couplers? Is not uniformity of more importance than actual perfection at first in an automatic coupler? Should not a brakeman or a yardman have the right to expect that every freight car he is required to couple or uncouple will have a coupler just like the last one he handled? Every brakeman and yardman knows when he sees a passenger car coming toward him to be coupled just how that coupling will be and must be done. He runs no risks from guess work or ignorance of that fact. But how about freight cars? He must often work in a hurry, often in the dark, or by the uncertain light of a lamp. He has no assurance the coupler is like that on the car last handled, or that cars are near enough of the same height not to add materially to the constant danger of coupling.

Again I ask, is it not due to these men that they may calculate with perfect confidence on the fact that there will be uniformity in couplers on freight cars? With multiplicity of form, will they not always be inclined to

step in between the rails to see what the coupler is, and how to operate it? This can never be done with safety. Should not, then, the expected legislation require uniformity?

There is now no possible monopoly as to the M. C. B. coupler. Then why should not all the roads come together and say that just this uniformity as to couplers must be the rule, and ask legislation to compel laggard or stubborn roads to come into line, and let uniformity be the safety so much needed and so justly due to the men?

Should not the law require that every M. C. B. coupler should be unlocked by the same device and motion? Should it not be also required by law that the knuckle or hook should be thrown open ready for engaging with the hook of another by the same identical motion of the brakeman's hand, and that without stepping between the rails?

It may be I am only showing my ignorance of the practical work of coupling and uncoupling freight cars. Still the question of uniformity for safety is a pertinent one. Let some of the more practical and abler men take up the matter and show us what is needed if this is not the one great thing. We must not longer delay. The blood of slaughtered men calls to us—if not to High Heaven—from the ground.

L. S. COFFIN.

Some New Light on a Recent Accident.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice that you make mention in your editorial column of Dec. 12 of a rear collision that recently happened on our road. While you very considerably withhold names, all of us who are interested, of course, know what case you mean, and as I am an advocate of the block system and am anxious that it shall not suffer in the least from detraction or doubtful reports about it, I venture to explain a point which you said you were uninformed upon.

You say that the engineer and some one else should be discharged. That is true, and some one else was discharged, to wit, the operator. These two men were responsible for the whole thing, and there was no failure whatever of the system. I do not know whether our officers care to have me say anything in their defense, but the facts certainly warrant the statement that they can be blamed for nothing unless it is in employing two men who should make such egregious blunders. Not knowing the individuals very well personally, I can offer no apologies for them, and cannot say what their previous records have been.

Now for the facts. The operator at the block station failed to light his block signal, making the excuse that he had sprained his ankle and could not climb up to the lamp; but the plain rule requiring him in case of such failure to exhibit a red light on the platform or track was wholly neglected. The engineer then disregarded the plain rule to treat an unlighted signal after dark as a danger signal. Moreover, he could have seen the semaphore arm by the light of his own headlight without difficulty. But to further convict himself of the worst kind of carelessness, he deliberately ran by, as you say, a red light which he could have seen for a long distance. As to the engine, the train was made up where there was no turntable, and it therefore could not have been turned around. As it was dark and there was no headlight on the tender, the conductor decided that with three brakemen at their posts on the platforms, and with a special caution to the engineer (which he gave), it was safer to run the engine pilot foremost and better to run without air brakes than to incur a long delay to repair the train pipe. On the whole, therefore, it must be admitted, as you say, that this was a queer combination of faults and accidents; but, after all, it was a quite simple combination.

NEW JERSEY.

Trestle Bridge Floors.

CLEVELAND, O., Dec. 13, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have noticed of late in several of your papers plans and specifications of different kinds of wooden trestles from various railroads. In all of them the principal construction of bent braces, etc., are good, but the floor system is very expensive in many cases, and work is done which is an extra expense both of material and labor. Any engineer will use what he deems best for the construction of bents, etc., whether they be of piles or framed of square timber, as the character of soil, the banks of streams or rivers governs this class of work in all cases.

One great fault is the use of corbels on top of caps under the stringers. This, it is claimed by many, strengthens the stringers and lessens the span of them. This is all well in theory, but in practice it involves extra framing and bolting and forms a larger space for the stringers to rot and does not in any way add to the strength of the structure.

On some roads the stringers are cut over each cap, and it is claimed that in case of any defects it can be renewed without much expense, which is a very good theory, but the strength of the structure is weakened, so far as the floor system is concerned.

To make a floor system strong, and also to successfully transfer loads a good way, is to make a packed stringer of three pins 7 in. x 14 in., or 17 in. x by 16 in.,

packed together with cast iron keys, and use two 3/4-in. bolts with cast iron washers to bolt them together, using one drift bolt 3/4 or 1 square through one stringer driven through stringers into caps. This will require but two drift bolts to each bent. Outside stringers can be used if necessity requires it. By using oak ties 8 in. x 8 in., 10 or 11 ft. long, sized to 7 1/2 in., and using ribbards or guard rail at the ends notched 1 1/2 in. over ties, and bolted with every fourth tie with 3/4-in. bolts, will make a strong track floor. Ribbards or guard timbers to be 6 in. or 7 in. x 8 in.; ties to be spaced 6 in. apart.

The best guard rails are old rails placed 6 1/2 in. between heads, and firmly spiked to the ties. The guard rails can be run out and meet at a point in centre of track 75 or 80 ft. from each end of structure. This also makes a good guard rail system for truss bridges whether through or deck.

Several years of practical experience has demonstrated the packed stringer to be the most successful, and it is stronger, and adds to the strength of rib or framed bent trestles.

S. L. VANCE.

Air Resistance at Very High Velocities.

CHICAGO, ILL., Dec. 16, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am inclined to believe that if your correspondent "Transmission," whose letter is published in your issue of Dec. 12, requires accurate information concerning the resistance of bodies moving through the air at velocities of about three miles per minute (231 ft. per second), he will have to obtain it by experiment, for it is my impression that almost nothing is known on the subject.

It is true that a good many experiments have been made with flat, thin planes at velocities of 15 to 100 ft. per second, and also with projectiles at speeds of 900 to 1,800 ft. per second; but not only is there a great gap between these velocities, but, moreover, results obtained with flat planes throw but little light upon the resistance of solids, because of the modifying influence of the forward and rear portions of solid bodies passing through the air. How much the resistance varies with the shape and how much it disagrees with theory will appear from an inspection of the following table, which has been chiefly compiled from the *Aerometry of D'Aubuisson de Voisins*:

CO-EFFICIENTS OF AIR RESISTANCE—SUNDRY FORMS.

Kind of bodies.	Theory.	Experiment.	Authority.
Prism at a plane angle of 90 degrees.....	0.50	0.728	Borda
Prism at a plane angle of 60 degrees.....	0.25	0.520	"
Cone, angle at summit of 90 degrees.....	0.50	0.691	"
Cone, angle at summit of 60 degrees.....	0.25	0.543	"
Cone, angle at summit of 51 degrees 22 minutes.....	0.19	0.433	Hutton
Demi-cylinder.....	0.67	0.570	Borda
Hemisphere and entire sphere	0.50	0.410	"
" " " "	0.50	0.413	Hutton
Parachute, convex.....		0.708	Dillon
" concave.....		1.936	"
Oblate spheroid, 3 diameters.....		0.298	Cayley
French war balloon "La France".....		0.18	Renard

Consideration of what probably takes place in front and rear of a body moving through air will indicate how inapplicable experiments with planes must be to curved surfaces and to solids, with our present knowledge.

In the case of a thin, flat plane, the front surface receives the pressure due to the impinging particles of air, and hence the action on this portion is presumably as the square of the velocity. But behind the plane another action takes place; the air is rarefied by the friction of the escaping particles and the pressure is diminished, so that the effect would seem to be increase of pressure in front and diminished resistance behind.

If this reasoning be correct, it follows that all formulas in which the resistance is expressed by a single term, such as that of Smeaton, $P = 0.005 V^2$, are probably incorrect, and that, to represent the action in front and the action in the rear, at least two terms are needed in the formula.

Next consider the action on a curved surface. It seems clear that, if convex, it will cleave and thrust sideways the impinging particles, and if concave it will condense and hold them. Accordingly we find that the parachute gives a coefficient of 0.708 on its convex and of 1.936 on its concave side.

Again, in the case of a solid body, the result must depend not only upon the front portion, which cleaves the air and compresses it sideways, but also upon the length and shape of the rear portion, which probably receives a forward component of pressure, as the air re-expands and closes in behind the body. Thus the action may be quite different to that in the case of planes, and there may be a rear reaction which will partly counterbalance the head resistance. The experiments on projectiles cover much too few shapes to serve as guides in evading the resistance of air, because, if the above reasoning be correct, the position of the largest section and the taper of the rear are probably more important than the exact shape of the head.

So far as we may judge by the sketches, the experiments of Mr. Crosby were chiefly performed upon solid

bodies, and this may be one of the reasons why his results differ so greatly from those obtained with flat planes. More, however, is probably due to the shortness of the whirling arm and to centrifugal action; and if your correspondent tries experiments, it will be well to make them upon straight paths as far as possible. Should he decide to pursue the subject, such information and scattered data as I have gathered will be very much at his service.

O. CHANUTE.

Eliminating the Possibility of Accidents.

NEW YORK, Dec. 22, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As an Englishman tolerably familiar with the conditions of railway working in England, who has just seen for the first time how things are managed here, I have read with keen interest the comments in the *Railroad Gazette* on the recent accidents in England. You and your correspondents discuss whether the Sykes system, a train staff, elongated detector bars, or other elaborate and costly appliances should be adopted to secure more absolute protection.

I might add another item to the discussion by stating that some at least of our lines seem to do all that is really necessary by a simple regulation providing that, if a train is shunted on to the wrong line, the brakeman shall forthwith go up into the signal box and remain there, his presence rendering mere forgetfulness on the part of the signal man a practical impossibility.

But it was not of this that I meant to speak. What I wished to do was to ask whether all the elaborate apparatus of precaution with which English railways have been compelled to surround themselves is really worth its cost. I have within the last few hours run through the main streets of a considerable town at a speed of 63 miles an hour. With us the most insignificant country road would have its bridge crossing built at an expense of, say, \$11,000. Within the last few days I have traveled at express speed in "limited" trains over great trunk lines worked by telegraphic crossing orders—a system which in Great Britain is looked upon as so wickedly reckless that it has just been forbidden by law even in the most out of the way districts of the Highlands of Scotland or the west of Ireland. And the more I have thought over the startling difference between English and American ideas on this subject the more I have felt inclined to believe that, broadly speaking, America is right and England is wrong.

We have unquestionably secured greater safety in railroad travel—the *Gazette*, if I recollect right, estimated it recently as in the ratio of three to one. But has the game been worth the candle? Our railways have cost per mile about as many pounds as yours have dollars, and of the causes which have gone to produce this remarkable difference unquestionably the chief has been the expenditure incurred in securing safety. And with what result? Our railways, with a density of traffic unequalled elsewhere in the world, cannot afford to reduce their rates below the point which is found remunerative on a line with half a dozen trains a day. Of course we all want to protect our own skins, and as long as we can get our protection *gratis* we naturally clamor for it. But put the question from the other point of view. Point out that theoretically perfect safety means practically high rates; say to the ordinary English factory hand: "At present you earn 30 shillings a week and your chances of being killed every time you travel is only one in a hundred millions; if you will consent that the chance shall be reduced to one in thirty millions, the companies will save so much money that they will be able to reduce the cost of carriage and that your wages will rise to 32 shillings." If any one were to say this to an English workman, can there be any doubt that he would reply: "Well, I think I'll risk it."

Of course, I am not arguing against all safety appliances, or denying that many companies both at home, and no doubt here, too, in America, have fallen short of the standard which the public had a right to expect them to attain. I am only wishing that there shall always be kept in view not only the point, "Will this innovation insure greater safety," but also the point: "Is the safety worth purchasing at the price which will in the end have to be paid for insurance by the public themselves?" When I see a statement that, "whatever cost it may entail to the railway companies, the public, and possibly in the end the Legislature, will not rest satisfied until all the railways have their lines signaled, interlocked and worked in such a manner that accidents such as have occurred during the last week will be impossible," quoted, apparently with approval, by a journal as authoritative as the *Railroad Gazette*, I cannot help feeling that this latter aspect of the question is being a good deal lost sight of.

W. M. ACWORTH.

Lap Sidings on the Cleveland & Pittsburgh.

Pennsylvania Company,
Office of the Superintendent
Cleveland & Pittsburgh Division,
WELLSVILLE, O., Dec. 13, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In complying with your request to give you some account of the "lap sidings" in use on this division, some statement of the general situation seems necessary. The Cleveland & Pittsburgh Railroad, operated as one

division of the Pennsylvania Lines West of Pittsburgh, is still further divided into three operating divisions:

The Tuscarawas branch, 31 miles long, on which three trains are run in each direction daily, built through a fine agricultural valley a generation since, when it was thought that the sole transportation of the products of the farm would afford a profit.

The River division, running for 94.5 miles along the Ohio River, with a heavy local traffic, and receiving on the upper 25 miles a large accession from the main line. While the curvature is, of course, great, the low grades (maximum 20 ft.) enable us to haul with consolidation engines, carrying 41 tons on the drivers, trains of 60 cars each, and so reduce their number that the problem of road service is a small one.

The main line from Cleveland to Wellsville, 101 miles, with its 153 curves of from one to seven degrees; with its undulating gradients, varying the westbound trains 19 cars Wellsville to KN tower, 30 cars from that point to Hudson, and 36 cars from Hudson to Cleveland, the east bound being uniform at 24 cars, with the lading consisting chiefly of coke, coal and iron ore, making the average carload 20.8 tons, the inertia excessive, and the braking difficult, and with an average of 52 trains daily throughout the year (27 per cent. being passenger), reaching frequently during the autumn 65 trains daily, and occasionally as high as 78, all of which must do work at seven first-class stations, is, as Kipling says, another story.

With the large and continuous growth in the business and but little change in the motive power, no addition to the track facilities had been made for many years until, in 1889, the question was taken up in earnest and the work of improvement vigorously prosecuted. The accompanying profile and plan show the situation in 1889, and at the present time, indicating the location and capacity of the passing sidings and the direction in which trains enter them when moving on their schedule rights. The short section showing alignment is taken from the most favorable portion of the line, the tangent on either side of Macedonia being the longest on the division.

In locating the passings, lines were drawn on the profile at intervals of five miles, and the location then shifted in case the grades demanded it. No attempt was made to retain them at the stations, and we now feel a distinct relief in cases where they were moved out into the country, as almost every temptation to kill time on the siding has been removed. We still feel, for example, the effect on the movement of the lunch counter at Alliance. In some cases, as at KN tower, the siding was located at the point to which trains backed to make a run for the hill, in cases where formerly they had frequently stalled on it, entirely removing that difficulty. The removal of the sidings from Macedonia Hollow abolished the point of greatest danger on the road; and whereas, formerly, accidents at that place were of frequent occurrence, we have had since the reconstruction no accidents at Macedonia, Bosworth or Wheelock.

The location of our grades prevented our following the plan adopted by Mr. Turner on the Pan Handle of having the trains in all cases feed toward the tower. [See *Railroad Gazette* Sept. 12, 1890.] For example, at McGarry, a westbound train moving toward the tower and using the siding would lie for its entire length on the grade and would pull out very slowly and with great difficulty, and this is true of various other places. At nearly all the "laps" the two switches at the "lap" are governed by Stevens levers in the tower, and a copy of the order putting the train on the siding is sent to the operator, who in locations like McGarry opens the switch for the train, which is thus able to enter the siding at about 10 miles per hour, and when released to drop out quickly. It is true that the engineer of the first section would, in case there were orders for him, have to walk back a half mile for them; but we are able usually to avoid sending orders to trains using the siding under this condition, and find this cause of delay but trifling, while the gain in time of movement is very considerable. We estimate a saving of eight minutes at the meeting point by having the operator control the switches and of six or seven minutes by avoiding the slow movement on the adverse grade. An advantage of 15 minutes in single track movement is a great desideratum, often meaning the success of the entire trip.

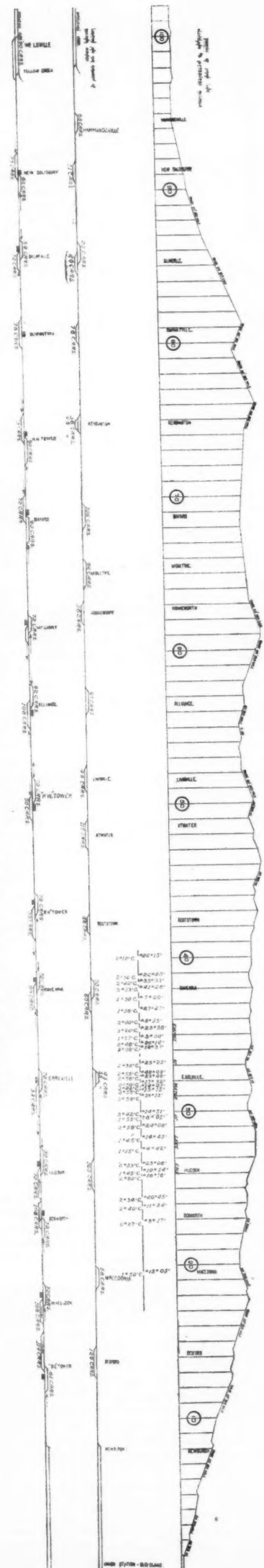
We find the advantages of the lap sidings all that you claim for them in your article of September 12, but feel that we have greatly increased their natural usefulness by our method of operating them. At first we numbered all main track switches, and meeting points were made, for example, at Salineville No. 10; but we felt this method to be hazardous as requiring an exact knowledge of many very complex situations, and finally adopted the following rule, which we placed upon the time card:

Only those switches connecting sidings with the main track at which trains are to be met by special order are numbered; No. 1 being the most easterly switch, and the numbers increasing toward the west. When trains meet at a numbered switch by special order, the train that can enter the siding without backing must do so.

This rule, in connection with the lap sidings, gives the dispatchers a masterful control over the train movement, to what extent may perhaps be most easily made clear by the quotation of a few orders. Eastward trains

The passing sidings as existing in 1889 are shown by the upper plan; as in 1890 by the lower one. The scale has been distorted to show the lap sidings clearly, hence they appear relatively much too long. Their car capacity is indicated.

PROFILE AND ARRANGEMENT OF LAP SIDINGS—CLEVELAND & PITTSBURGH RAILROAD.



have the absolute right of track under Rule 84. Trains 37 west, 38 east passenger, and 118, east freight, meet per schedule at KN tower.



Under normal conditions No. 37 would take siding at No. 1, No. 118 at No. 4, leaving the main track clear for No. 38. The lap avoids the backing out of the siding by No. 37 and enables it to pull out directly No. 38 has passed. Frequently, however, No. 37 is a trifle late. To hold it back at Summitville would delay it badly and 118 worse. Ordinarily it would be helped out by a time order against No. 38, and both trains be delayed while it took the siding. We make the movement by meet order.

"No. 37, engine 16, and No. 38, engine 14, will meet at KN tower, No. three (3)."

The order is short and explicit; the lap avoids the backing out of the siding by No. 38 and the use of the numbered switch avoids any delay whatever to No. 37 and does not add to the delay of No. 38.

If No. 38 be late, the order would read:

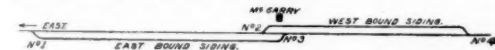
"No. 37 and No. 38 will meet at KN tower No. two (2)."

"No. 38 will run 10 minutes late, Bayard to KN tower."

"No. 37 will wait at KN tower No. three (3) until three fifty-seven (3:57) p. m. for No. 118, engines 88 and 63."

No. 37 is advanced a half mile westward, No. 118 is advanced three-quarters of a mile eastward, and No. 38 suffers no detention. This order is not often given under these conditions, but it is given with frequency when freight trains in each direction and one passenger train are to meet.

I said that we refrain as far as possible from sending orders to trains at points where they feed away from the tower. We often make this movement: No. 123, freight, is due at McGarry at 10:56 p. m., and is scheduled to meet No. 124, freight, due out at 10:56 p. m., and No. 88, freight, due out at 11:32 p. m. The order would read: "No. 123, engines 2, 31, 38, 90 and 35, First and Second No. 124, engines 61 and 42, and No. 88, engine 26, will meet at McGarry No. four (4)."



This puts the eastbound trains on the westbound siding and heads the engines past the tower, where they can get their orders.

No. 36 and No. 2 are eastbound passenger trains scheduled 10 minutes apart. No. 2 leaving the division at Hudson for Columbus and Cincinnati. Frequently they meet delayed freights at B Q tower, and an order is sometimes issued making a double track movement, the switches at the lap being thrown for the sidings by the operator. Substituting K N for B Q, so as to use the figure above, the order would read:

"Nos. 36 and 2 will wait at K N tower until eight-forty (8:40) a. m. for 1st, 2d and 3d 123, engines 25, 38 and 46, and No. 89, engine 26; Nos. 36 and 2 will take siding at K N tower No. four (4) and 1st, 2d and 3d 123 and No. 89 will take siding at K N tower No. one (1)."

As a rule, our freight trains are run in convoys of three sections and the sidings are built to hold three sections of loads, all the cars figured at 37 ft. It often happens that we are hauling a good many empties eastward, in which case it becomes necessary to side-track these trains on the longer westbound sidings, which is readily accomplished by orders similar to the example of one given at McGarry. In fact, a considerable number of combinations will at once be apparent which will go far towards explaining our experience that it is next to impossible to get trains in such shape as to cause a block at one of our passing sidings.

Of course, the questions always asked of any new scheme are, What did it cost? What are the results? Is the first justified by the last?

We did some work on every passing siding on the division. Some were simply lengthened out, the main track shifted in position and the lap formed by a cross-over. At points a new siding was built on the opposite side of the main track, and in the majority of cases new sidings were built entire in new locations, the material from the old ones abandoned, being used in the new construction. Great care was taken to locate them so that they might eventually be incorporated in the future double track, this being in every case insisted upon. The entire cost of the fifteen sidings, including additional right of way, bridges and culverts, grading, track, telegraph towers and the machinery at the towers, was \$31,757.47 (including estimated cost of sidings at Earlville, not yet completed).

The most evident results may be said to be:

First—An added safety to the dispatching, as many of the orders are sent to the operator as well as to the train crews, adding this additional check to those provided in the uniform rules.

Second—The arrangement for the passing of trains at the meeting point is made by the dispatcher, the one man who has a full knowledge of the entire situation, in a concise and perfectly definite order, saving time in the transmission, and giving celerity to the movement.

Third—The better location of the passing sidings avoids many and expensive accidents, the precise money saving from which it is impossible to estimate ac-

curately, but which may be approximately estimated from the following figures:

Wrecks.	Total cost.
1887.....	\$6,447.40
1888.....	16,967.42
1889.....	6,886.28
1890, 11 months.....	2,233.95

Fourth—Each westbound freight train will average four meeting points on the road in which with the usual straight sidings the trains will first pull into the siding, then back out and then pull ahead on the main track, running in each case 1.4 miles, which are avoided by the use of the lap sidings. Limiting this extra mileage to the westbound freight trains, though it frequently applies to westbound passenger, and sometimes to eastbound freight, we have for the daily movement a saving of 106.4 miles. Wellington in his "Railway Location," page 170, gives the average cost per train mile for the roads of the United States at 90.3 cents, of which the items involved in the movement under consideration amount to 43.93 cents per train mile; the wages of engine and train crew being taken at the present average proportion of overtime. As these figures are for the mileage between terminals, and include the extra running at passing points, they should be here reduced to 41.6 cents per train mile when the total distance run is considered. This would show for the nineteen daily average westbound freight trains an expense of \$44.23 and for the year of 300 days \$13,278.72.

Fifth—Prior to February, 1888, we paid overtime after 12 hours; since that date the runs have been divided on the basis of a speed of 10 miles per hour and overtime paid on that basis, making it accrue on this division after the train has been on the road 10 hours. Under the present practice the overtime for November, 1887, would have approximated \$2,000.

The amount paid in November of each year is as follows:

November, 1887.....	\$964.08
" 1888.....	1,767.65
" 1889.....	1,407.30
" 1890.....	394.02

The problems of conducting transportation, as I understand them, are to move fast and slow traffic over the same piece of track, and to so arrange the making up and work of the trains as to secure punctuality and dispatch.

For the solution of the first problem for single track roads, we offer, in the language of the patent attorney, what we believe to be a new and novel invention, being a combination of the lap siding suggested by Mr. E. W. McKenna, then Superintendent J. M. & I. Division, in an article read by him before the Train Dispatchers' meeting at Louisville, Ky., in 1884, and first brought into practical use by Mr. J. J. Turner, Superintendent of the Eastern Division, Chicago, St. Louis & Pittsburgh Railroad, at Plain City, Ind., in 1887, with the use in train orders of numbered switches recommended by Mr. J. A. Anderson, then Superintendent Belvidere Division, Pennsylvania Railroad, in "The Train Wire," published in 1888.

L. F. LOREE.

Indian Railroad Notes.

There has been very little improvement so far as railroad traffic is concerned since I wrote last. The few companies which have recorded better results than last year only show a very small increase in gross receipts, and as some of them did badly last season, there is very little to brag about. There is plenty of grain in the country from last season's crop, and the present crop will be a big one in many districts. The gold craze still continues, and many dealers in produce, both European and native, have forsaken their legitimate business in order that they may gamble in mining scrip.

The East Indian Railway Co. has sent home a large order for automatic vacuum brakes, and therefore, so far as the leading road is concerned, the brake question is practically settled. The Westinghouse advocates are still fighting bravely, and public opinion is considerably in favor of the American brake.

The English *Engineer* is very wroth with Sir A. M. Rendel for condemning steel axles on the plea that commercial steel deteriorates and becomes brittle. Owing to the large number of breakages on the Rajputana, and Bombay, Baroda and Central Indian railways, Sir A. M. Rendel has advised that the steel axles now in use be replaced by the best makes of Staffordshire and Yorkshire iron. The steel makers will no doubt protest against this *dictum*, but there have certainly been a very large number of accidents owing to steel axles failing, and our well known consulting engineer will have no difficulty in showing ample reasons for making the change.

The Delhi-Kalka Railway was to have been opened in time for the exodus from Simla on the 15th inst., but it has now been postponed to Jan. 1. The narrow-gauge line from Kalka to Simla will, it is hoped, be taken in hand shortly. The promoters have been fighting hard for a government guarantee, but public opinion against such a course was very strong. The terms now agreed to are as follows: The capital to be subscribed within one year of the contract being given, and the line to be completed within three years.

The East Coast Railway has been commenced and the survey of the lines from Bezevada to Madras has been sanctioned. When these roads are completed there will be direct communication, by broad gauge lines, between Calcutta and Madras. At present Calcutta passengers

and freight have to travel to within a few miles of Bombay before they reach the line which will take them to Madras.

The East Coast Railway is certainly one of the most important that has been started within the last quarter of a century, as it runs through districts which can supply a large quantity of traffic, and there are no engineering difficulties. The bridge over the Kistna will consist of 12 spans of Whipple-Murphy steel girders of 300 ft. clear span, founded on double octagonal wells, sunk to a depth of 80 ft. below low water level. As both metre and 5 ft. 6 in. gauge rolling stock will have to pass over this bridge, three rails will be laid. The only other river of importance, the Godavery, is not to be bridged at present, but a steam ferry will be provided. In addition to saving half the distance from Calcutta to Madras, the East Coast Railway will enable pilgrims to visit the celebrated shrine of Jagannath at Puri with safety. More than 200,000 persons worship yearly at this temple, and the usual route is down the Hooghly and through the Soonderbunds and then along the coast to Cuttack. In 1887 a coasting steamer, the "Sir John Lawrence," was lost in a cyclone while engaged in this service and over 600 persons perished.

The Zhoib Valley Railway survey has been commenced, and it is hoped that a route which will be safe in all weathers and seasons will be found. Our frontier railways have cost an immense amount of money, but every heavy storm puts some portion of them *hors du combat*.

The latest proposal in railroad matters is a line to connect India with Burmah. The route proposed is via Chittagong to upper Burmah.

The different firms of mechanical engineers and iron founders have sent a strong appeal to the government of India against the present system of ordering all materials required by the Public Works Department through the Secretary of State. In many cases work is delayed owing to the non-arrival of roof and bridge girders, or other iron work, from Europe, although they could be supplied at a lower rate and of equal quality in the country. The government professes to be very anxious to develop the mining industries, and to encourage native labor, but at the same time prohibits the purchase of certain classes of material, locally.

Reductions are still the order of the day on most railroads, and more are contemplated. Much dissatisfaction has been caused by the introduction of the 55-year rule on the E. I. R., as it affects a large number of old servants who had not received any intimation of such a measure being contemplated, and therefore had depended upon retaining their posts, so long as they were fit for service and conducted themselves well. It is expected that other guaranteed railroads will follow this lead, although it does not, at present, affect the subordinate grades on State Railways. What makes it worse is the recent decision of government that retiring gratuities are not to be given to employees who have reached the age limit, as they have had ample time to make provision for their future wants. A new weekly paper, published in the interests of the subordinate grades of railroad and government employees, prophesies a strike, unless the working staff are treated with more consideration. A large number of railroad employees, principally engine drivers and guards, are now out of work, and the rates paid to all classes of European workmen are slowly but surely declining. Good men who can speak the vernacular, and understand how to manage large bodies of native workmen, will always be able to hold their own.

The Kidderpore docks have come to grief. On the 7th inst. the last wall was found bowed out, and a few hours after the upper edge of the wall, for a distance of 1,400 ft., was bulged out from 2 ft. to 5 ft. 10 in. The wall, in addition to being moved forward, was tilted over considerably, and the engineer, Mr. Apjohn, recommended that the dock should be flooded at once, so as to prevent further mischief. Before this could be accomplished the southwest wall, for a distance of 450 ft., was forced out quite 10 ft., and there were several bad cracks. The water is now within 6 ft. of coping level and the backing of both the east and southwest walls is still sinking, but Mr. Apjohn hopes to remedy the evil in a short time. At present the work is at a standstill, but if no further movement takes place the water in the graving dock and tidal basin will be pumped out in a few days and the excavation completed.

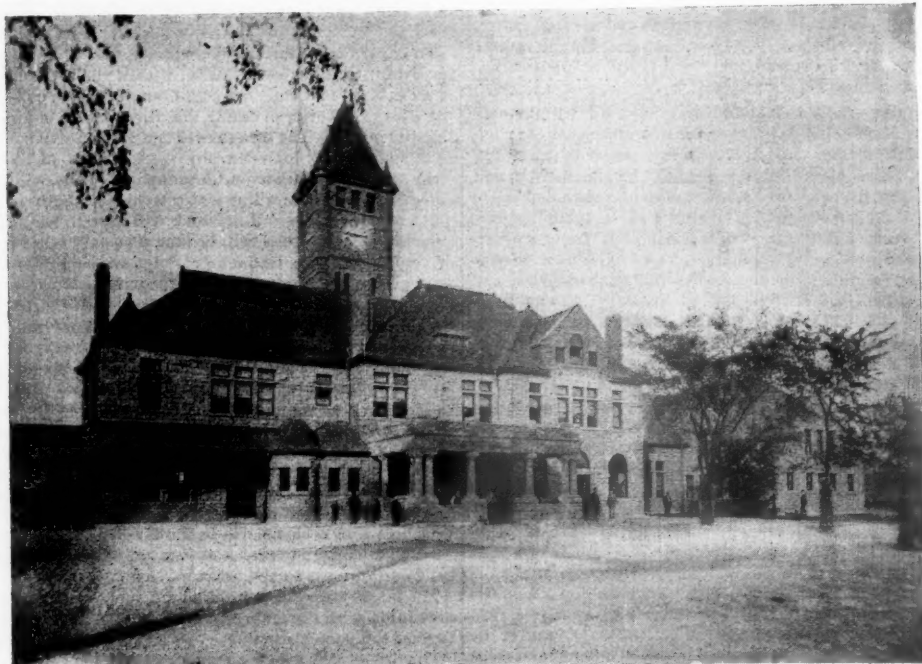
CALCUTTA, Oct. 20, 1890.

NUT-LOCK.

The Census of the Lake Commerce.

The secretary of the Lake Carriers' Association, Mr. Keep, has had access to the census returns of lake commerce afforded him, that he might secure figures with which to emphasize the plea of the carriers for more and better lights on the lakes. The figures show that the business fleet consists of 2,055 vessels of 826,300 net registered tons, valued at \$58,128,500. Of these 1,153 are steamers, with a tonnage of 523,702 tons. These steamers are apparently valued at \$92.50 and the sailing vessels at \$32 per ton. Of the steamers, 68 are steel vessels, valued at \$11,964,500; tonnage not stated.

This fleet is ascertained to have carried during the season of 1890, 27,417,500 net tons a computed average distance of 566 miles, giving 15,518,300,468 ton miles carried on the lakes as against 68,727,223,146 ton miles carried by



PASSENGER STATION OF THE MICHIGAN CENTRAL RAILROAD AT BAY CITY, MICH.

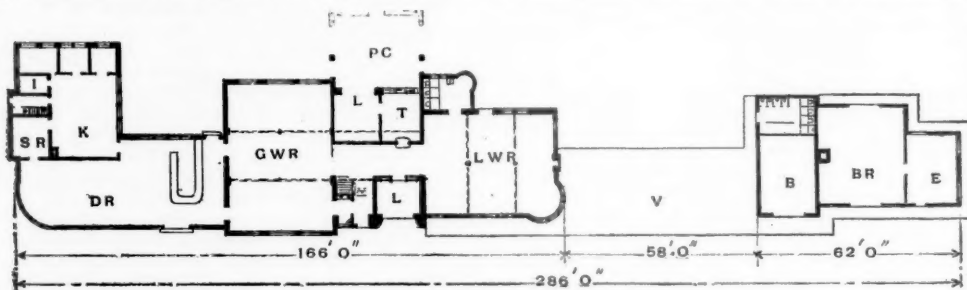
all the railroads of the country during the year ending June 30, 1889. The classification of lake freight is as below in tons of 2,000 lbs. each:

	Tons.
Iron ore.....	7,650,455
Coal.....	6,080,697
Lumber.....	5,676,426
Shingles and lath.....	235,298
Flour.....	823,764
Wheat.....	969,144
Corn.....	1,329,613
Oats and other grain.....	615,319
Salt.....	296,540
Pig iron.....	147,553
Miscellaneous.....	2,960,789

Of the above freight 7,516,022 tons passed through the government lock at the foot of Lake Superior, and was

out, a reddish brown stone, rock faced, and laid in broken courses, as shown. The roof is covered throughout with red tile.

The inside finish is mostly birch, except in the men's waiting room, where it is red oak. The birch finish costs about the same as red oak and gives a more pleasing effect. The women's room is provided with the usual retiring rooms and a fireplace that burns wood. The buildings are heated throughout by one of McEwan's hot-water heaters. The small building attached to the large one by a shed roof is used for the men's water closets, baggage room, express room and boiler room. At the extreme south end of the main building is a dining room, attached to which are the necessary



PASSENGER STATION OF THE MICHIGAN CENTRAL RAILROAD, BAY CITY, MICH.

Plan of Ground Floor.

REFERENCES.—G W R, Gentlemen's Waiting Room; L W R, Ladies' Waiting Room; V, Veranda; B, Boiler Room; B R, Baggage Room; E, Express Room; D R, Dining Room; K, Kitchen; S R, Serving Room; I, Ice; T, Ticket Office; L L, Lobby; P C, Porte Cochere.

valued at \$83,732,527. On this basis the cargo carried by the lake fleet was worth \$305,432,042, and as the cost of carriage was 1.5 mills per ton mile, by adopting this as the cost of the total traffic the payments for this freight service was \$23,177,541, or nearly 40 per cent. on the valuation of the fleet. The net receipts are not given, but it has undoubtedly been a year of small profits.

Attention is called by Mr. Keep to the fact that by the report of the Interstate Commerce Commission the average charges per ton mile on the railroads of the United States for the fiscal year 1889 was 9.22 mills, so that the saving on the freights carried on the lakes was, for the single year 1889, \$119,801,734.

Much of this freight, being of low value, as in the case of the ores of the Gogebic and Vermillion ranges, and that proportion of the returned freight required for those engaged on those ranges, would not have offered if the condition of the waterways and harbors had not admitted the present style of large vessels. Many of these are run with great precision and dispatch. For example, two propellers of the Western Transit Company have each made 27 round trips between Buffalo and Chicago, in each instance but one keeping their schedule time, and each covering a distance of 24,003 miles. They carried during the season an aggregate of 205,000 tons.

Bay City Passenger Station.

We show herewith two perspective views and a plan of the passenger station recently built at Bay City, Mich., by the Michigan Central Railroad. The floor plan is explained by the lettering shown with it, and the principal features of the exterior view also speak for themselves.

The material of the main walls is of one kind through-

kitchens, carving room, cold storage room, store rooms, etc., with four sleeping apartments in the second story for the help.

The second story of the main building, together with a few rooms in the third story, is used for offices for the Division Superintendent and his assistants, the Assistant General Freight Agent and his clerical force, the Resident Engineer, Roadmaster, Conductors and Car Accountant.

The architect of the building is Mr. Frederick H. Spier, of Detroit.

The Gold Heating System Applied to Pullman Cars.

The Gold Car Heating Co. is equipping the Pullman cars "England" and "France" for the Pennsylvania "Limited" with the new system of pipes and heater shown in the accompanying cuts. Fig. 1 represents the arrangement of pipes through the car. Fig. 2 illustrates a Baker stove fitted with the Gold compound double coil for heating and circulating the water by means of steam taken from the engine. The apparatus may be briefly described as follows:

Two spiral coils of 1½-in. pipe are interwound within the casing of an ordinary Baker car stove. Each coil contains a ¾-in. steam pipe, which projects a few inches at each end to admit of steam connections. Steam being admitted from the supply pipe through the steam pipes F, fig. 2, passes by the valves G into the coils A, where its heat is imparted to the surrounding water contained in the outside pipes. The steam being gradually cooled passes downward through the coil, and escapes by the discharge pipes Q, which, uniting later, connect with the steam trap shown in fig. 3. Each steam pipe is provided with a gauge and siphon S.

The water, which is gradually heated in the coils ascends through the water pipes B, which, uniting at T, carry it to the expansion tank, whence it descends by the hot-water column O. This column divides at the car floor, one branch passing to each side of the car, so that the heating process is not only carried on more rapidly but can be better regulated by means of valves in each branch. The water returning enters the coils at the bottom by means of the return-pipes E, and thus completes the circulation. In case steam cannot be had from the engine, the coils are heated by a coal fire in the stove in the usual way.

As before stated, the condensed steam discharges through an Excelsior steam trap, shown in fig. 3. This steam-trap is a thermostatic one, and is protected from dirt by a sediment well, to which is fitted an automatic relief trap, which, acting under varying pressure, acts as an auxiliary to the steam-trap in discharging condensation. A globe valve is placed in the bottom of the sediment well for the purpose of blowing out any dirt which may collect in it.

Brake Rigging—Its Care and Operation.*

BY R. A. PARKE.

In the consideration of the subject of brake rigging for locomotives and cars, it may, in general, be divided under three heads:

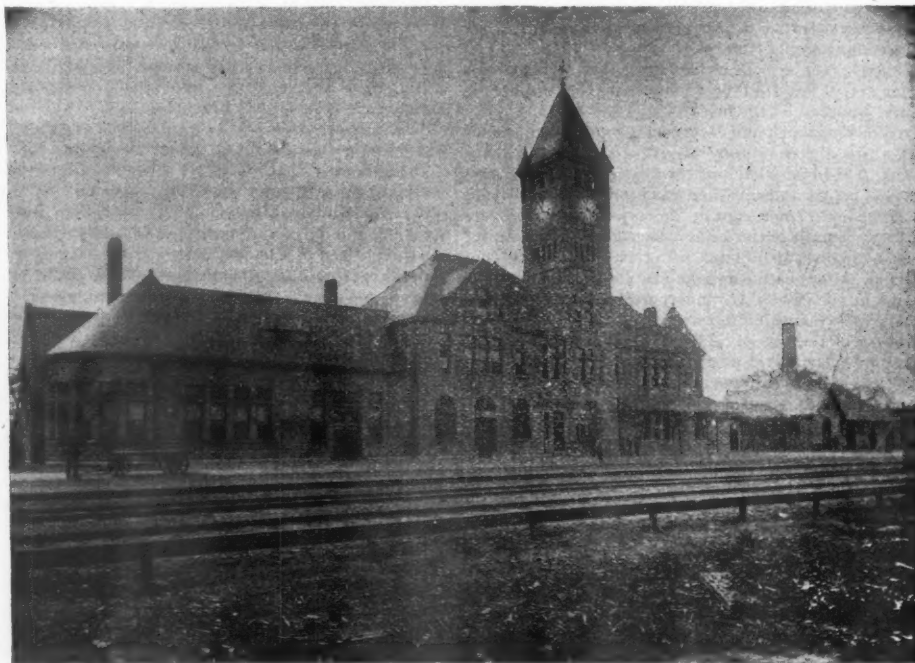
First—The character of the apparatus itself and of its attachment.

Second—The care which is given it in its maintenance, and

Third—The manner in which it is handled in operation.

... It is not a little surprising that, with the develop-

* A paper read before the New York Railroad Club Dec. 18, 1890.



PASSENGER STATION OF THE MICHIGAN CENTRAL RAILROAD AT BAY CITY, MICH.

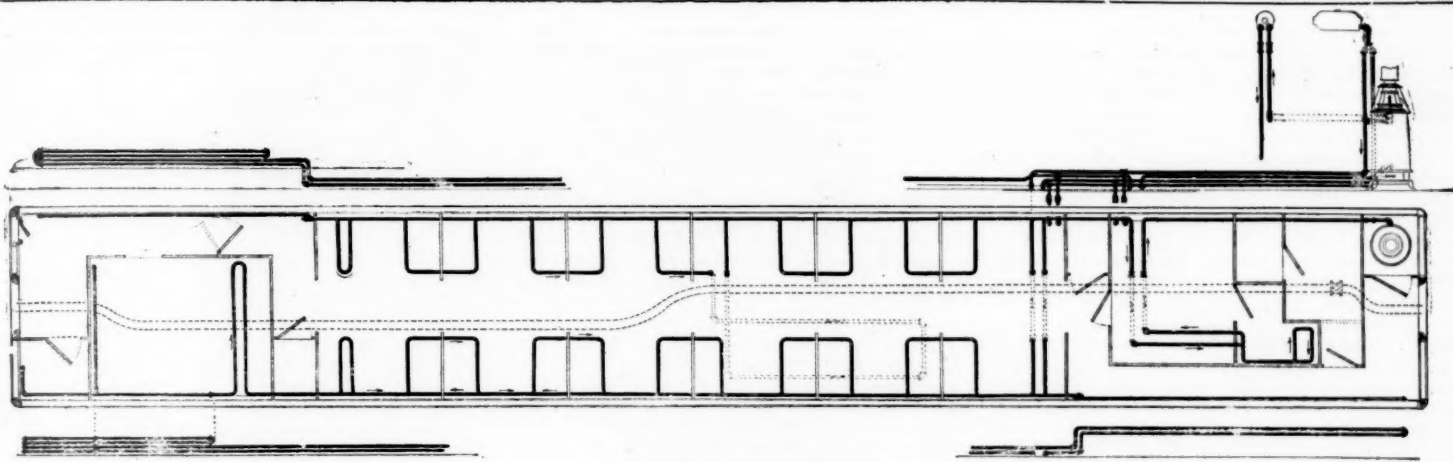


Fig. 1—Arrangement of Heater Pipes.

THE GOLD HEATING SYSTEM WITH COMPOUND DOUBLE COIL.

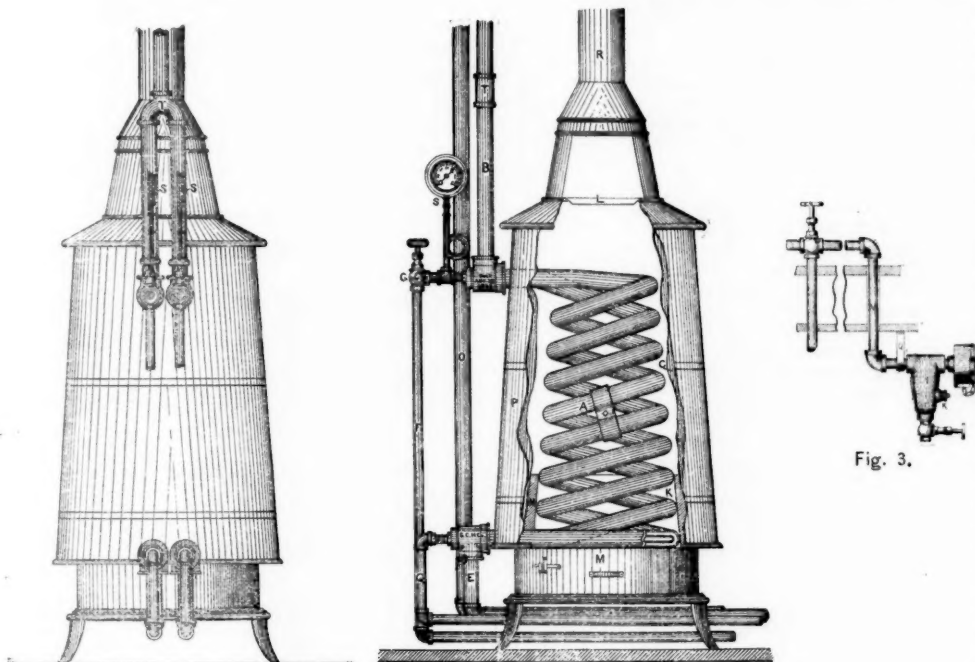


Fig. 2—The Gold Compound Double Coil and Baker Stove.

ment of the passenger service, both as to speed and weight of cars, requiring a braking force, which has gradually increased to nearly double what it was on the earlier forms of such rolling stock and, while attention has been given to the strengthening of wheels, axles, truck frames and the car body construction, the strength of the brake rigging had, up to two or three years ago, been scarcely modified at all. In many cases the braking force itself had not been altered to correspond with the increased weight of new vehicles, but the same apparatus was used throughout as had been used upon lighter cars. Where the leverage was altered to increase the braking force, the same sizes and character of material were used, and only the proportions of the levers were changed. The results of applying the quick-acting brake to this character of brake rigging were somewhat startling, in the breaking of rods, bending of levers and springing of the apparatus as a whole, to such an extent that the efficiency of the brakes was, in many cases, almost destroyed.

When the system of brake gear, which is now adopted, by the Master Car Builders' Association was brought before railroad men, it almost uniformly brought out an honest protest. The sizes of iron for the levers, rods and pins were so largely increased over those which had been customarily used, that they seemed ponderous and extravagant to nearly all who had not gone into the subject thoroughly. It is, however, only necessary to state, that these sizes were determined after careful experiment, and their selection was based chiefly upon two considerations. These were freedom from spring or deflection and security against rapid wear. The question as to the strength of parts against actual breakage, became removed from consideration altogether, in the securing of such strength as should eliminate undue deflection of levers and, in the determining of the size of pins, the necessary strength was very far exceeded in such pins as would endure the service imposed upon them, where lubrication is not only inconvenient, but worse than useless, as oil in such a locality is merely an attraction to dust and grit, which would vitiate its service and cause greater wear than would occur in its absence.

Probably no one, who has not actually experimented with the stretching of rods, the deflection of levers of inferior dimensions and the lost motion due to the rapid

wear of small pins, could realize what a considerable portion of the travel of the brake piston is thus absorbed and lost to effective work, where the earlier forms of brake rigging are applied to cars of modern weight. It is only necessary to say that, in many instances, the piston travel, due to weak apparatus alone, exceeds half the stroke of the piston and, as a result, the piston travels nearly, and in some cases quite, its full stroke, in merely taking up the necessary slack and the unnecessary deflection, without bringing an effective pressure upon the brake shoes.

The stronger form of brake rigging has, however, been pretty generally adopted, and it is hardly necessary to go further into this part of the subject. There are, nevertheless, one or two considerations, which have not received very general attention, and which merit special notice at this time. One of these is the brake beam.

That wooden beams may be trussed or plated in a manner, which will give them the proper strength, can hardly be doubted. That they are not so trussed or plated, in nearly all cases where trussing and plating are adopted, is very evident. More than this, the wooden beams, properly so strengthened, can hardly be made so durable or so cheaply as some form of iron or steel beam.

I desire to call your attention to one of a number of experiments which have been made, at different times and in different localities, upon trussed wooden brake beams. The results are fairly applicable to all beams of this description.

In the case mentioned, I selected a car of modern construction, weighing about 55,000 lbs., having the brake leverage suitably proportioned for such weight of car. The brake beams were $3\frac{1}{2}$ in. \times $7\frac{1}{2}$ in. at the centre, and were trussed with two $\frac{1}{2}$ -in. round iron rods, in what is commonly known as the Pullman style of trussing. The brake shoes were brought up against the wheels snugly by means of the hand brake; the distance between the brake beams, at their centres, was carefully measured; the points where the wheels rested upon the rails were marked, both upon the wheel and rail; the hand brakes were then released and the air brake fully applied. The distance between the brake beams, at their centres, was again measured, and the movement of the wheels upon the rails, due to clearance in the pedestals etc., was noted and subtracted from the reduced

distance between the brake beams, thus leaving a clean measurement of the spring of the two brake beams. The spring of the two brake beams was found to be $\frac{1}{8}$ in. under full application of the brakes, or $\frac{1}{16}$ in. for each beam. With the leverage required to produce the proper braking force upon this car, the deflection of $\frac{1}{8}$ in. at the centre of the brake beam required a movement of the brake piston of 0.91 in. to take it up—or a total movement of the piston of $3\frac{3}{4}$ in. was necessary to compensate for the spring of the four brake beams. Nearly one-third the total stroke of the brake piston was required for a kind of service, which should not exist. Less than $\frac{1}{8}$ in. piston movement would have occurred in taking up the spring of four good iron or steel brake beams, such as may be found in the market. A deflection of this extent, occurring with a brake beam trussed in this manner, which is usually supposed to be ample, will suggest an easy conjecture as to what may be expected from the ordinary untrussed wooden beam.

The clearance of each brake shoe, in the above experiment, was about $\frac{1}{8}$ in.; the piston travel necessary to take up the clearance of the shoes was 4 in.; so that the portion of the piston travel required for taking up the necessary brake shoe clearance and the spring of the brake beams was $7\frac{1}{2}$ in. The piston actually traveled 10 in., thus leaving a movement of $2\frac{1}{2}$ in. for the lost motion and deflection of the balance of the brake gear. The size of the iron, used for all levers, was $3\frac{1}{2}$ in. \times $\frac{3}{4}$ in. and the diameter of the pins was $\frac{1}{4}$ in.

Thus, with the brake gear reasonably adjusted for a proper clearance of brake shoes, there remained only 2 in. of piston travel to compensate for wear of shoes. This travel would be exhausted, the piston would reach the cylinder head and fail to produce an effective pressure upon the brake shoes, with about $\frac{1}{16}$ in. wear of each brake shoe. It is unnecessary to call your attention to the fact that, upon long runs, where frequent application of the brake is necessary, this amount of wear would take place before the run is completed, and, though the adjustment might be carefully made before starting out, the braking force would be seriously impaired before the train reaches its destination.

Another element in the efficiency of brake gear I cannot avoid emphasizing once more, although it has recently met with not a little consideration. This is the construction of the brake apparatus upon locomotives and upon cars having more than four wheels in the trucks, so that the proper braking force is applied to each wheel.

The efficiency of the braking force in retarding the motion of a train is, for the purpose of comparison, the ratio of the total braking force to the weight of the whole train. When it is remembered that, upon short trains, the weight of the locomotive often reaches 50 per cent. of the weight of the entire train, it is hardly necessary to call attention to the great reduction of efficiency of the brakes where the driving wheels of the locomotive are unbraked.

Similarly, as the weight of the cars, upon six wheeled trucks, is uniformly distributed upon all the wheels, one-third of the available braking force is lost, by the neglect to apply the brake to the middle pair of wheels.

During the last few years accidents upon railroads have been so frequently attributed to the failure of the air brake that the Westinghouse Air Brake Company has organized a regular system of investigation, as complete as possible, in all such cases, and I conceive that it will be interesting to you, in this connection, to learn the results of some of our investigations.

A little over a year ago an accident occurred upon a trunk line, where a train, running at the rate of 40 to 50 miles an hour, crashed into the rear of another train which had stopped upon the main track. A number of persons were killed and injured. The second train was flagged at a probable distance of 300 or 400 feet from the rear of the standing train. The brakes were promptly applied, but, although the speed was much reduced before the trains met, the results were as stated. The second train consisted of an engine and eight cars, seven

Fig. 3.

of which had six wheeled trucks, with brakes upon only four of the six wheels. The locomotive was equipped with driver brakes, which were automatically applied, in conjunction with the train brake. The maximum braking force applied to the train was 49 per cent. of the total weight of the train. Had all the wheels of the six wheeled trucks being properly braked, the braking force would have been 79½ per cent. of the weight of the train.

The efficiency, therefore, of the brakes as applied, for stopping the train, was but 61.6 per cent. of what it should have been, or, in other words, had the brakes been what they ought to have been, they should have been capable of stopping the train in about 62 per cent. of the distance in which it could actually have been stopped. It is impossible to estimate whether the train might have been stopped in this particular case; but it is unquestionable that the speed of the train would have been reduced to a very much greater degree, before it struck the preceding train, and it is more than possible that the fatality might have been averted.

During the present year a disaster occurred, with loss of life, through two passenger trains meeting upon a crossing. The train which should have stopped consisted of an engine and three cars: the engine was without driver brakes and one of the cars had six-wheel trucks with only four of the six wheels braked. The train ran 650 feet beyond the point at which it should have stopped, before striking the other train. The engineer testified that he was carrying an air pressure of only 40 lbs., which he deemed sufficient. If such was the fact, the braking force at his command was 21 per cent. of the weight of the train, and if he was carrying 70 lbs. air pressure, as he should have been, the braking force would have been 44.4 per cent. of the weight of the train. Had the locomotive been equipped with driver brakes and the six-wheeled trucks properly equipped, he would have had at command a braking force of 70.5 per cent. of the whole weight of the train. That is, with a proper train pipe pressure, the train, properly equipped, could have been stopped in 63 per cent. of the distance required, if the engineer was carrying the proper pressure with the apparatus he had; or, in 34 per cent. of the distance required, with the apparatus he had, if he was only carrying 40 lbs. air pressure. In this case, there is no doubt of the negligence of the engineer, as his train was not under proper control; but granting him the same degree of negligence, had the brake apparatus been what it should be, the disaster would have been avoided.

Illustrations of this kind might be multiplied; but more are not necessary to enable me to convince you that it is a most serious fact to contemplate, that a majority of all the passenger trains, running in the United States to-day, are so equipped with brake apparatus that, in the necessity for a short stop, they would run from 25 per cent. to 75 per cent. further than would be the case, if they were as fully and effectively equipped with brake apparatus, as they might consistently be. This is a somewhat startling statement; but I am glad that it may be said, that the matter is being now considered in serious earnestness, and many roads are rapidly removing this invitation to disaster.

I cannot leave this branch of the subject without calling attention to the objectionable practice of operating the driver brake as a separate device, for special use. There have been two principal objections to operating this device automatically, in conjunction with the train brake. One was the extra wear of the tires, which shortened their mileage between turnings. With the advent of a form of shoe which brings wear only upon those portions of the tire, which are not affected by the wear of the wheel on the rail, this objection has been quite removed. Instead of reducing the time and mileage of service between turnings of the tires, they are now increased from 50 per cent. upwards, and the regular use of the driver brake at all stops has become an actual advantage in this respect.

The second objection has been that, where the brakes of the entire train are operated in all cases simultaneously, the engineer has nothing in reserve for special emergencies.

There are two things to be said in connection with this; one is, that, if all the brakes are operated by one movement, they will all become applied more quickly and do more effective work than if two movements are required. The best that can be done, in an emergency, is to immediately apply all the retarding force available, and what advantage can arise, from applying one part of it and then another, it is impossible to understand.

The other is, that experience has shown that, in the time of emergency, when disaster and death seem imminent, those actions which have become established habits, are the only ones which may be relied upon. Of all times in the average man's experience, when he is least liable to exhibit calm judgment and thoughtfulness, the moment of excitement, in impending disaster, is the supreme one. The numerous instances where the driver brake might have been applied, but was not, confirm the soundness of this doctrine.

With regard to the second division of this subject, that is, the care accorded to the brake apparatus, much may be said. I will content myself with drawing your attention to one or two features of it.

The first is the attention given to taking up the slack of the brake rigging, due to the wear of the brake shoes,

No matter how strong the brake beams, or how efficient the levers, rods, and connections, if the slack is not frequently adjusted as the brake shoes wear, the brake piston will soon reach the limit of its stroke—especially upon heavy cars where a considerable leverage is necessary—and the brakes will become ineffective. Within the past month, while I was conversing with a master mechanic, in his office, an engineer handed in a report of an accident, in which he struck a farm wagon upon a crossing, from the failure of the brakes to stop the train. He showed that, when he applied the brake, he had ample distance in which to stop before reaching the crossing, under ordinary circumstances. This engineer is, from our point of view, worthy of special mention. He displayed a degree of good judgment, worthy of an investigating Westinghouse Air Brake Co.'s inspector. Not being satisfied with the fact that his brakes did not hold the train, and so reporting it, he got out and examined the brakes upon the cars, and discovered that most of the brake pistons were resting against the cylinder heads, and that, while the brake apparatus is properly constructed and usually very effective, the oversight or carelessness of the station car inspector had robbed him of the ability to stop his train when the necessity arose.

Under this caption should also be mentioned the neglect to repair disordered parts of the brake apparatus, which so necessitates the operation of the train, with only a portion of the brake apparatus in use. In the past it has, in some localities, been a custom to cut out a portion of the brakes upon the train, from an impression that the train can be better handled with a part of the apparatus in use than with the whole. Again, under the supposition that, while it was more desirable to have the whole of the apparatus in use, it was well enough to run with a portion of it cut out, trains are frequently run with defective apparatus cut out of use. It is less than a year since the folly of this custom was demonstrated to be criminal.—[Here are cited the Lake Shore accident at Bay View and the Erie accident mentioned editorially in the *Railroad Gazette*, Dec. 12.]

The Westinghouse Air Brake Company has never pretended that mechanical apparatus of its construction is exempt from ordinary care and attention, such as any other mechanical apparatus would require.

Some time since, a visit from a representative of the Westinghouse Air Brake Company was asked for by a master mechanic, to investigate certain troubles with the brake apparatus, which were causing annoyance upon his road. The representative discovered the cause of the trouble at once, upon examining the apparatus. The master mechanic stated that he could not understand why this difficulty had been met with by them; that the brakes upon his cars had been in use now about nine years; that nobody had ever touched the apparatus or even looked into it, and they had never before had any trouble. In our judgment, it was about time that he was having trouble. There is a well-known fable concerning the man who taught his horse to live without eating. Here is a perfectly parallel case. This master mechanic had nine years in service an apparatus with working parts, subject to the influences of friction, wear, and accumulated dirt, which he had never oiled or even examined. He had just reached the conclusion, that this apparatus would have gone on in its service, without attention, forever—if it had not unfortunately gotten out of order.

When the exposed position of this apparatus and the constant vibration and shock which it endures are considered, it is a matter of great wonder that it goes on fulfilling its regular functions, with so much regularity and faithfulness, in spite of the fact that it so often meets with such utter neglect. Pipes shake loose from insufficient fastening, causing leaky joints; hose is left hanging, permitting accumulations of grit, dirt and ashes in the coupling, to be afterward blown into the triple valve and cylinder; and, after an examination of brake apparatus, as we have found it applied and cared for upon some roads, it has been a source of lively astonishment that any efficiency at all was attained.

The compression of atmospheric air involves supersaturation with moisture and consequent precipitation of the water. It is a regular accompaniment of air compression for all kinds of service. The water collects, wherever pockets are found for its reception, and it must needs be removed. It is not usually a serious feature, except where it is left to accumulate, when very undesirable results must follow. To attain the full efficiency and best results from the use of the brake apparatus, it must have such care as is required of any ordinary mechanism with moving parts. Instances of serious annoyance, in the application and release of the brakes, have occurred from failure to properly inspect and care for the air apparatus in these particulars.

It is a pleasing thing to note, in this respect also, that a very marked improvement has recently taken place upon many of the railroads, and there seems to be a general tendency to systematically and regularly inspect, clean and lubricate the moving parts of the mechanism.

There is but one head of my subject left for consideration, and this subject—the operation of the apparatus—has been so fully dealt with, and quite recently, that I shall not detain you with an extended view of it.

Perhaps the most difficult feature in securing the proper handling of the brakes by the engineer is, in a vast

number of cases, already formed, unfortunate habits on the part of the engineer. The Westinghouse Company, during the past two years, has been constantly called upon to regulate brakes upon cars, which were reported to be giving trouble, and which were found, upon examination, to be in thoroughly excellent condition, but which were being badly operated by the engineers. The bad practices of the engineers were not so apparent with the use of the plain automatic brake, as they are with the quick acting form, and, as the engineers maintain these same practices, which formerly brought no actual complaint, they are ever ready to find an excuse for the trouble, by ascribing it to the brake mechanism upon the cars. It is difficult to teach old dogs new tricks, and it has been a tedious process, requiring long-suffering patience, to remedy this annoyance. It probably will never be entirely removed, until another generation of engineers has come on, which has been initiated into the proper practice, from the outset. . . .

Switching Problems.

A correspondent asks us to elucidate one of the switching problems with which young railroaders have been wont to entertain themselves from time immemorial. The mysteries of "sawing by," of turning a whole train on a couple of 30 ft. rails and of other conundrums where there is no possible solution except by tossing the cars over the smokestack, always have a charm for trainmen with a speculative turn of mind—especially when they are in a warm "lobby" on a cold day and there is no way of testing the various questions, except on paper—and we therefore publish two of the questions with solutions. As these have not been printed in the *Railroad Gazette* before since 1884 our old readers will pardon the divertisement.

A B is the single main track of indefinite length, C D

a side track which will hold 30 cars with engine attached. The problem is to pass two trains composed of engine and 60 cars, each approaching from opposite directions, without the aid of flying switches, ropes, etc., the trains to proceed on their respective journeys as though nothing of the kind had taken place. The simplest solution is the following: Let the eastbound freight leave 30 cars on the main track west of the siding, and run in on the siding with engine and 30 cars. The westbound freight then goes west until it clears the west end of the siding and couples on to 30 cars of the eastbound freight. Then the engine and 30 cars in the siding run east on to the main track. Then the westbound freight backs in on the west end of the siding, bringing 30 cars of the other train with it, leaving them on the siding and backing out on the main line, and then going west with the train. The engine and 30 cars of the eastbound freight then back in on the east end of the siding, the balance of the cars are attached and the train goes on east.

The other problem is this: Siding will hold 35 cars and engine. Thirty-five empties, not coupled, are standing on it. The problem is to pass two freight trains of 35 cars and engine each, going in opposite directions, without coupling up the empties in the siding.

Solution: Let, say, eastbound train stop just before reaching siding, uncouple engine and run it on to siding. Now let westbound train couple to eastbound train and draw it along main track until just opposite siding, and leave it there; then westbound train is to enter siding and push train of empties and engine out on main track, leaving siding clear, when westbound train is to back down and push eastbound train along main line until eastbound train engine can push empties back on siding, which it will also take; when westbound train can resume its journey, hauling eastbound train with it until its engine can leave siding in front of the train, when it can couple up and go ahead.

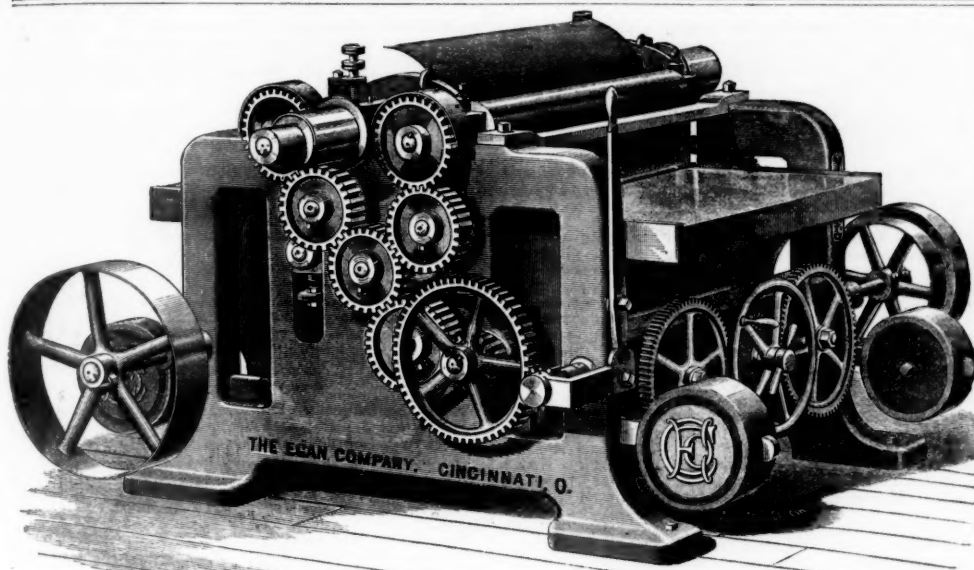
A New Heavy Planer and Smoother.

The hardwood planer and smoother shown here has been lately brought out by the Egan Company, of Cincinnati, O., to meet the constantly increasing demand for machines for heavy, fast and extra fine work. It is constructed on an improved principle, and combines strength and solidity. The builders make machines on this style 24, 26, 28, 30 and 36 in. wide. The cut shows a 30-in. machine, and each size is built in proportion.

The frame is entirely cored and very substantially braced. The table is dovetailed in the frame and rises and lowers on long inclines by means of two screws operated by a hand-wheel convenient to the operator. This means of adjusting the bed is considered to be the best, as it makes the bed solid and free from vibration.

The feed consists of four powerfully geared feed rolls of large diameter, and the fluted or front feed roll is driven by expansion gearing, making it impossible for the roll to lift out of gear when taking a heavy cut. The feed rolls are weighted on an improved principle, the weights being adjustable to give more or less pressure as desired. There are two speeds to the feed, and it is claimed that this machine will do smoother work at its fastest feed than has heretofore been attained on any other smoothing planer at a much slower speed.

The cylinder is four-sided, so as to use either two or



NEW No. 4 HEAVY PLANER AND SMOOTHER.

four knives, as may be desired. It is double belted, and the feed is run directly from it. There are pressure bars on each side of the cylinder, arranged on a new principle, which work to the circle of the head, thus preventing all tearing out of wavy grained or knotty stuff, either narrow or wide, or clipping of ends.

One of the greatest advantages of this machine, especially in the wide sizes, is that the stock can be run diagonally under the cylinder, permitting straight belts being run to the cylinder, and the planing of short stuff. It is specially adapted for planing framed stock where straight and cross-grained wood is built up.

For further information address the manufacturers, The Egan Company, Nos. 202 to 222 West Front street, Cincinnati, O.

Train Accidents in the United States in November.

NOTE.—This record has, in consequence of the growth of the railroad system of the country, come to require so much space in the paper that we have determined to abbreviate it. The accounts of accidents are gathered from newspapers and other sources the same as heretofore, and the summaries given in the editorial columns will be made in precisely the same manner, but detailed accounts will, as a rule, be printed only of accidents which cause death or injury to persons. Train accidents resulting from unusual or peculiar causes, or which are for any reason of exceptional interest to railroad men generally, will, however, be reported as before, regardless of this rule.

COLLISIONS.

REAR.

2d, on Lehigh & Lackawanna road, at Benders Junction, Pa., a local freight of this road was run into at the rear by a Pennsylvania, Poughkeepsie & Boston extra freight, killing a conductor.

2d, on Southern Pacific, near Weimar, Tex., a freight train broke in two and the rear section afterward ran into the forward one, derailing and damaging several cars. Conductor and brakeman injured.

2d, on Philadelphia & Reading, near Royersford, Pa., a freight train which had stopped to do some switching was run into by a following freight. The rear brakeman of the foremost train had been left behind at a preceding station, and the head brakeman, a new man, did not go back far enough. The fireman of the colliding train, who ran back to help set brakes, was thrown from the cars and killed. The wreck took fire and was partially consumed.

6th, on Pennsylvania, in the tunnel at Trenton, N. J., an express train ran into the rear of a local passenger train, disabling the colliding engine and causing the baggage car of the foremost train to collapse. Engineer and fireman of the express were injured in jumping.

6th, on Pittsburgh & Lake Erie, at Braddock, Pa., a freight train ran over a misplaced switch and into the rear of another freight standing on a side track, badly damaging engine, caboose and a number of cars. The caboose and 2 cars caught fire from the locomotive and were burned up. Engineer badly hurt.

6th, on Pittsburgh & Lake Erie, near West Newton, Pa., an accommodation train ran into an engine with caboose preceding it, doing considerable damage, injuring 3 trainmen.

7th, on Central of New Jersey, near Hopes Lock, Pa., a passenger train ran into the rear of a coal train in a fog, derailing 15 cars, 2 of which were thrown into an adjacent canal.

7th, on New York Central & Hudson River, near Tribes Hill, N. Y., a car in a freight train broke down, necessitating the stoppage of another train following. The flagman of this second train, who had gone out with a signal, came in again on a call of a whistle which was not intended for him, and the engine on which he came ran into the rear of his own train, there being a dense fog at the time. Engine, caboose and several cars wrecked.

8th, on New York, Lake Erie & Western, at Susquehanna, Pa., switching engine ran into the rear of a freight train, wrecking caboose and damaging the engine. Engineer injured.

11th, on Old Colony, near Yarmouth, Mass., a passenger train with only one passenger car was run into at the rear by a work train. Two trainmen and 5 passengers injured.

12th, on Delaware, Lackawanna & Western, at East Buffalo, N. Y., a car of an eastbound freight train was derailed by the spreading of the rails and thrown over upon the westbound track, causing the stoppage of a gravel train; before the conductor of this could put out a flag a freight train ran into the rear of it, wrecking 2 cabooses, killing 1 and injuring 9 employees.

14th, on Philadelphia & Reading, at Shamokin, Pa., a very long freight train, which had become uncontrollable in descending a grade, ran into a switching freight, making a very bad wreck, part of which was thrown off the end of a trestle. The fireman of the freight was injured by jumping.

14th, on Long Island road, at Jamaica, N. Y., passenger train ran into the rear of a market train consisting of platform cars loaded with wagons containing produce, and a caboose at the rear in which the market men were riding. Three of these men were injured. There was a dense fog at the time, and it is said that the signals were not properly exhibited.

14th, night, on Chicago, St. Paul & Kansas City, at Elkton, Minn., freight train standing at the station was run into at the rear by a following freight, wrecking 2 cars and killing 3 trainmen. The flagman went back the proper distance and swung his lantern, where the following train could see it for 200 rods, but no notice was taken of it, and it is believed that the men on the engine were asleep.

14th, on Louisville, New Albany & Chicago, near Putnamville, Ind., a freight train which had been flagged where a bridge was being repaired was run into at the rear by a following freight, wrecking caboose and derailing 3 cars.

14th, on Southern Kansas, at Ottawa, Kan., freight train standing at the station was run into at the rear by a following freight, wrecking the engine and a dozen cars. The wreck took fire and most of it was consumed, and a tramp was killed.

14th, 6 a. m., on Pennsylvania road, at New Florence, Pa., westbound passenger train No. 9, which had stopped for water, was run into at the rear by baggage train No. 7, wrecking a sleeping car, in which were 23 passengers. Three of these were killed and 12 injured. A fireman was also injured. The operator at Nineveh gave No. 7 a clear signal when the block was not clear, and there was a dense fog. The flagman of No. 9 had not time to go back far.

15th, on Perkiomen road, near Pennsburg, Pa., a freight train broke in two and the forward portion, which, after running some distance, was slackened to avoid crossing a trestle at dangerous speed, was run into by the rear portion, wrecking a number of cars. One brakeman killed.

16th, on International & Great Northern, at Dumont, Tex., passenger train ran into the rear of a freight train standing on the main track without displaying lights. Fireman injured.

16th, on Galveston, Houston & Henderson, at Allen's Switch, Tex., a freight train moving slowly into a side-track was run into at the rear by a special newspaper train, wrecking caboose and one car. The wreck took fire from the locomotive and a portion of it was consumed. One fireman injured.

17th, on Ferney Mountain Railroad, at Lock Haven, Pa., a passenger car descending a steep grade by gravity became uncontrollable and collided with a locomotive, killing 2 passengers and injuring 4.

19th, on Chicago, Milwaukee & St. Paul, near Vining, Ia., a freight train broke in two, and the rear portion ran back down grade and into a following freight. Engineer and fireman injured.

20th, on New York Central & Hudson River, at Rhinecliff, N. Y., a freight train which was moving into a siding was run into at the rear by a passenger train, wrecking 4 freight cars. Engineer injured. The semaphore signal stood at danger to stop the passenger train, but it is said that the runner "supposed it was for another train."

20th, on the tracks of the Union Stock Yards, at Chicago, the engine of a switching freight ran into the rear of a preceding freight, killing the engineer.

21st, 3 a. m., on Memphis & Charleston, at Grand Junction, Tenn., several cars of a freight train broke loose in ascending a grade and ran back into the head of a following freight, overturning the engine and killing a fireman. The engineer was badly injured.

24th, a. m., on Pennsylvania road, at Spruce Creek, Pa., an eastbound freight train broke in two while descending a grade and the rear portion ran into the forward one, wrecking 15 cars and blocking both main tracks. Westbound passenger train second No. 9 ran into the wreck before it could be flagged and the engine was overturned and 2 passenger cars badly damaged. Engineer and fireman injured.

24th, on Chicago & Northwestern, at Maple River, Ia., freight train ran into the rear of another freight, damaging engine and 5 cars. Engineer and fireman slightly injured.

24th, on New York, New Haven & Hartford, at Greenwich, Conn., an eastbound freight train ran past a block signal, and into the rear of a preceding freight, wrecking caboose and several cars. The caboose took fire from the stove.

24th, on Cincinnati, New Orleans & Texas Pacific, near

Glen Alice, Tenn., a freight train which had stopped between stations was run into at the rear by another, breaking an oil car so that the oil ran out. The fluid caught fire, and 22 cars were burned up.

25th, in Chicago, Ill., a passenger train of the Chicago, Rock Island & Pacific ran into the rear of a Lake Shore & Michigan Southern freight at Forty-ninth street, on the track used jointly by the two companies. A trespasser on the passenger train was killed.

25th, on Atchison, Topeka & Santa Fe, at Burlingame, Kan., passenger train ran into the rear of a freight which was going on to a side track, but had not quite cleared the main track. Engineer injured by jumping.

26th, on Louisville & Nashville, at Morris Station, Ala., a freight train ran into the rear of another freight, doing slight damage. Fireman injured by jumping.

26th, on New York, Lake Erie & Western, near Nutley, N. J., a passenger train ran past a block signal standing at danger, and also past a red light in the hands of a flagman, and struck the rear of a preceding passenger train. The hind car of this train was empty and the damage was slight, but several passengers were injured.

27th, on Vermont Valley road, near Brattleboro, Vt., passenger train ran over a misplaced switch and into a new engine standing on a side track, badly damaging both engines. Three passengers injured.

27th, on Columbus & Western, at Donovan's, Ala., freight train ran into the rear of a preceding freight, wrecking caboose and injuring fireman.

29th, 4 a. m., on Boston & Albany, at Palmer, Mass., a westbound freight train broke in two while descending a grade toward the crossing of the New London Northern road. The signal at this crossing being at danger, the forward portion of the train was stopped and the rear portion ran into it, wrecking a number of cars. It is said that the crossing was clear, but that the signalman was asleep.

29th, on West Shore road, near South Schenectady, N. Y., a work train ran into the rear of a freight, making a bad wreck and injuring an engineer.

And 22 others, on 16 roads, involving 7 passengers and 36 freight and other trains.

BUTTING.

3d, on Baltimore & Ohio, at Taylorstown, Pa., butting collision between a gravel train with engine 306 and switching engine 150, making a very bad wreck, killing engineer and a laborer. Engine 150 was ordered to protect itself against 306, but failed to do so. The conductor of 150 testified at a hearing that he received no copy of the telegraphic order under which his train was running, but took the word of the engineer.

3d, on Baltimore & Ohio, near Locust Point, Md., butting collision between freight trains, badly damaging both engines and injuring both engineers.

3d, 5:40 p. m., on Delaware, Lackawanna & Western, at Rock Cut, N. Y., passenger train ran over a misplaced switch and into the head of a freight train standing on the side track, making a very bad wreck. Both engineers and both firemen were killed and 4 trainmen and 1 passenger were injured. The switch was misplaced by a station operator immediately before the passenger train struck it. He ran to it hastily, under the impression that it was wrong and needed to be set right, and discovered his mistake just too late. The operator was only 17 years old, and the railroad company was censured by the Railroad Commissioners for employing so young a person.

4th, on New York, Lake Erie & Western, near Oil City, Pa., butting collision between a freight and a switching engine, badly damaging both locomotives. Ten oil tank cars were thrown into a creek and caught fire, and, together with a bridge and several adjacent buildings, were burned up. Three trainmen injured.

5th, on New York, Ontario & Western, near Carbondale, Pa., butting collision between a passenger train and a local freight train, making a very bad wreck, killing 3 passengers and injuring another. The conductor and engineer of the freight, who were running on the time of the passenger train, say they forgot that it was due. The railroad company instituted legal proceedings against them under the criminal law, and the conductor, Thomas Kerns, was convicted of "neglect of duty."

9th, p. m., on New York & New England, near Brewsters, N. Y., butting collision between freight trains running at high speed. Both engines and several cars wrecked and three trainmen injured. It is said that the westbound train was running on the time of the east-bound.

10th, on Georgia Pacific, near Edwardsville, Ala., collision between an eastbound passenger train and a westbound freight, badly damaging both engines and injuring an engineer. It is said that the freight train ran past a station at which it had telegraphic orders to meet the passenger train, and that the engineer of the freight did not know the road thoroughly.

11th, on Northern Pacific, near Tacoma, Wash., butting collision between eastbound freight 56 and westbound freight 59, derailing nine cars of coal. The conductor of 56 had an order to wait at Tacoma, but failed to do so. The report says that he at first denied receiving the order, but was convicted by the dispatcher's book.

14th, on New York, Ontario & Western, at Mountindale, N. Y., passenger train No. 2 ran over a misplaced switch and into the head of a freight train standing on the side track. Engineer and fireman injured.

14th, on Baltimore & Ohio, near Scott, O., butting collision between freight train 21 westbound and engine 1002 eastbound, wrecking both engines and many cars. Engineer and two firemen killed, and two other trainmen injured. It is said that engine 1002 was waiting on a side track for two trains from the east; one of these broke into two parts, and the front portion set back past the side track to recouple its train. It then proceeded, and was taken by the engineer of 1002 to be the second freight.

18th, on Chicago, Milwaukee & St. Paul, near Truesdale, Wis., butting collision between two freight trains, owing to an operator's failure to hold one of them at a preceding station. Both engines and 20 cars wrecked.

18th, on New York Central & Hudson River, at Tribes Hill, N. Y., a westbound freight train waiting on the eastbound freight track was run into by a freight train from the west, derailing one engine and several cars. Fireman injured.

14th, on Norfolk & Western, near Fords, Va., butting collision between freight trains, wrecking engines and 16 cars. One trainman killed and 5 injured. It is said that the collision was caused by an operator's negligence.

14th, on Louisville, New Orleans and Texas, near Vicksburg, Miss., butting collision between two freights, due to misinterpretation of orders. Both engines were disabled and a fireman was injured by jumping.

18th, on Southern Pacific, near Marysville, Cal., butting

ting collision between an empty engine and a gravel train, badly damaging both. One employé injured.

22d, on Cleveland, Canton & Southern, near Brimfield, O., butting collision between freight trains, wrecking both engines and 15 cars. Engineer, fireman and one brakeman injured. The southbound freight had orders to wait for two sections of the northbound train, but started out after the first had passed.

24th, on Union Pacific, near Howell, Wyo., butting collision of freight trains, wrecking both engines and many cars. One fireman killed. It is said that the engineer of the westbound train ran past a meeting point.

24th, on Illinois Central, near Dubuque, Ia., butting collision between gravel trains, killing one employé and injuring another. It is said that the trains were not properly protected by flags.

26th, on Illinois Central, at Kankakee, Ill., southbound fast mail train ran over a misplaced switch and into the head of a passenger train standing on the side track, killing the fireman and injuring the engineer.

26th, on Chicago, St. Paul & Kansas City, near Valeria, Ia., butting collision between a passenger train and a freight, wrecking engines and a number of cars. The conductor of the passenger train saw a train standing on a siding at the point where he should have met the freight and supposed it was the one he was to meet, whereas, in fact, it was not.

27th, on Denver & Rio Grande, near Canon City, Colo., butting collision between passenger trains 7 and 4, the former being wrongfully on the latter's time. Brakeman injured by jumping.

And 10 others, on 10 roads, involving 2 passenger and 18 freight and other trains.

CROSSING AND MISCELLANEOUS.

2d, night, on Kansas City, Memphis & Birmingham, at Plantersville, Tenn., a passenger train collided with some freight cars which had been carelessly pushed from a siding and started down grade by a freight train which was going into the side track, badly damaging the cab of the locomotive and injuring 3 trainmen.

6th, night, on Pennsylvania, at Everson, Pa., a freight car which was being let down a grade got beyond control of the brakeman and crashed into a standing caboose, badly damaging both cars. A man in the caboose was killed and the brakeman on the runaway car was badly injured.

7th, about 3:40 a. m., at the crossing in Junction City, Ky., the rear sleeping car of a Cincinnati Southern passenger train standing at the station was run into and considerably damaged by a Louisville & Nashville freight approaching the crossing uncontrolled, injuring 8 passengers.

17th, on International & Great Northern, at Kyle, Tex., a passenger train which was going into a siding was struck in the side by a pay-car train approaching rapidly from the opposite direction. Two passenger cars were overturned and 25 passengers were injured.

18th, on Birmingham Belt road, near Birmingham, Ala., a passenger train was run into at the rear by a loaded freight car which had broken loose from a freight train. Conductor killed and 3 passengers injured.

18th, at Cleveland, O., a switching engine of the Cleveland & Canton ran into a freight train of the Valley road at the crossing of the two lines, badly damaging the engine and 1 car. Engineer injured.

20th, on Long Island road, at Valley Stream, N. Y., passenger train ran into a freight which was switching on the main track, wrecking a freight car. Fireman and 5 passengers injured.

21st, 5 a. m., on Baltimore & Ohio, at the crossing of the Northern Central, half a mile east of Canton, Md., an eastbound passenger train ran into a freight of the other road standing on the crossing, wrecking 2 cars of coke and badly damaging the engine. Engineer injured.

22d, on St. Clairsville & Northern, as a passenger car was standing at St. Clairsville, O., loaded with passengers, ready to make the trip to Bartons, the brake was jarred loose, and the car started down the steep grade, and becoming uncontrollable, ran at high speed 5 miles to Bartons, where it struck an engine of the Cleveland, Lorain & Wheeling, badly damaging both. The road is very crooked, and it is said the trip was made in less than 5 minutes. Five passengers were slightly injured.

30th, on Union Pacific, at Ogden, Utah, a passenger train collided with a switching train, wrecking both engines. Brakeman and 1 passenger injured.

And 11 others on 9 roads, involving 1 passenger and 20 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

3d, about 6 p. m., on Chicago & West Michigan, at Interlochen, Mich., an officers' train, consisting of engine and 2 cars, ran off a derailling switch at the crossing of the Manistee & Northeastern. The engine and forward car went into the ditch, injuring 3 officials of the road. The red glass in the signal lamp protecting the crossing had slipped down, displaying a white light to the engineer.

5th, on International & Great Northern, near New Braunfels, Tex., a span of a bridge over Comal River gave way under a north bound freight train, the engine and 3 cars going down into the stream below, fatally injuring both engineer and fireman.

6th, on Cleveland, Cincinnati, Chicago & St. Louis, near Indianapolis, Ind., passenger train running 30 miles an hour was thrown from the track by the spreading of the rails, badly damaging several coaches and slightly injuring a number of passengers.

12th, on Philadelphia & Reading, near Annville, Pa., passenger train consisting of engine and 3 cars derailed by a broken frog. Two trainmen and 9 passengers injured.

12th, 8 p. m., on Southern Pacific, at Lake Labish, near Salem, Ore., a southbound passenger train running 20 miles an hour, was derailed on a trestle, and 4 cars tipped off into a marsh and were wrecked. Engineer, fireman, and one passenger killed, and 16 passengers injured. There is evidence that a rail may have been maliciously removed from the track, but the trestle was in poor condition. This accident was reported in the *Railroad Gazette*, of Dec. 5 and Dec. 19.

13th, on Delaware & Hudson Canal Co.'s road, at Saratoga, N. Y., a car in a passenger train was derailed at a frog, and caused to run so far from the main track as to overturn the car in front of it. The latter was dragged some distance on its side and badly damaged, but only one passenger was injured.

14th, on Texas Central, near Terrell, Tex., southbound mixed train derailed by the spreading of the rails. One passenger and one brakeman injured.

15th, night, on Chicago & Erie, at Leveig's Switch, Ind., an eastbound freight train descending a steep grade was thrown from the track by the spreading of

the rails, badly wrecking the engine and 23 cars. The wreck caught fire and much of it was burned up. Engineer killed and 2 other trainmen fatally injured.

16th, on Georgia Southern & Florida, near Jasper, Fla., a freight train broke down a trestle over a small creek and 8 cars fell through. Two brakemen injured. The trestle was one of the best on the road, and it is believed that a derailed car must have caused its failure.

17th, 6:30 a. m., on Kansas City, Wyandotte & Northwestern, near Kansas City, Mo., switching freight train crossing the bridge over Kaw River broke through and with the bridge went down into the stream, which is shallow. A number of men and boys going to their work had boarded the train to ride across the river and a large number of them went down in the wreck. Ten of these were killed and 2 injured. Four of the trainmen were injured. The wreck caught fire from the caboose stove and most of the wooden portion that lay above the water was burned up. The failure of the bridge was due to a defect in the support of one of the transverse members of the floor system. See *Railroad Gazette*, Dec. 19.

21st, on Baltimore & Ohio, at Wheeling, W. Va., engine of a passenger train which had just backed into the passenger station fell through the bridge over Wheeling Creek, which supports a portion of the station, and was entirely submerged. The engine was a heavy one, and stood on the middle of one of the spans. The bridge was mostly of cast iron, and was built in 1852.

22d, on the Southern California, near Cajon, Cal., 2 cars of a special passenger train was wrecked by running upon a burning bridge. The forward portion of the train got over safely, but one car was consumed by fire. Baggage-master injured.

22d, on Chicago & Northwestern, near Baraboo, Wis., freight train fell through the bridge over the Baraboo River, precipitating 24 loaded cars into the stream.

And 7 others on 7 roads; 3 to passenger trains and 4 to freight.

DEFECTS OF EQUIPMENT.

6th, 3 a. m., on New York Central & Hudson River, near Tribes Hill, N. Y., a journal under a sleeping car of a passenger train broke and the truck was dragged several miles before the breakage was discovered.

10th, p. m., on Southwestern of Georgia, near Smithville, Ga., freight train derailed by a defective wheel, injuring 2 trainmen and killing 5 horses, which were in one of the cars.

15th, on Union Pacific, at Leroy, Wyo., passenger train derailed by the breaking of a tender truck, and most of the cars thrown down a bank. Engineer, fireman and several passengers injured.

21st, on Meriden, Waterbury & Connecticut River, near Meriden, Conn., freight train derailed on a trestle by the dropping of a brake beam and 2 cars overturned down a bank just after leaving the trestle. One brakeman killed and 1 injured.

24th, on New York, New Haven & Hartford, at Cos Cob, Conn., freight train derailed by the dropping of a brake beam, which caught in a switch, piling up the cars in a very bad wreck and blocking both tracks.

24th, on Burlington & Missouri River, near Wymore, Neb., passenger train derailed and ditched by the breaking of a journal of the tender.

25th, on East Tennessee, Virginia & Georgia, near Farrill, Ala., freight train derailed by a broken truck, which, running upon a trestle, caused the destruction of the bridge and a number of cars. Three trainmen injured.

And 9 others on 8 roads; 2 passenger and 8 freight and other trains.

NEGLIGENCE IN OPERATING.

2d, on East Tennessee, Virginia & Georgia, at Johnsonville, Ga., a freight train ran over a misplaced switch, wrecking the forward portion of the train. Engineer and fireman killed.

4th, on Chicago & Northwestern, at Beloit, Wis., a passenger train derailed by an unlocked switch and wrecked. Fireman killed and number of passengers injured.

10th, on Seattle, Lake Shore & Eastern, near Gilman, Wash., train No. 6 loaded with logs became uncontrollable while descending a steep grade and the whole train, except the engine, was derailed at a curve. The trainmen jumped to the ground and were slightly injured.

14th, on Cincinnati, Wabash & Michigan, at Warsaw, Ind., passenger train derailed by a misplaced switch. The train was moving slowly and the damage was slight.

17th, night, on Concord & Montreal, near Hookset, N. H., southbound freight train derailed by running over a bull which had fallen out of a car of a preceding freight train. Some of the cars fouled the northbound track and were run into by another freight, and both engines and 18 cars were wrecked.

20th, on Delaware & Hudson Canal Co.'s road, near Scranton, Pa., passenger train ran over a misplaced switch and on to a turntable track, where the engine fell into the pit.

26th, on Wisconsin Central, near Stevens Point, Wis., passenger train derailed by a misplaced switch, the engine and baggage car being wrecked and thrown over an embankment. The latter caught fire and was partially destroyed. Engineer killed and fireman injured.

26th, on St. Louis, Iron Mountain & Southern, at Olyphant, Ark., freight train derailed by an ice machine rolling off a flat car and falling back upon the track, and 10 loaded cars wrecked. A tank car was overturned, and the oil, which ran out, was ignited by a match thrown upon the ground by a workman in the wrecking gang, who had to light his pipe before he could begin operations. The whole wreck was burned up.

28th, on Union Pacific, near Hay, Wash., a heavy freight train became uncontrollable on a heavy grade and ran several miles at high speed until it was finally derailed and thrown down a high bank and completely wrecked. The track was left entirely clear, the speed of the train having been about 70 miles an hour. Fireman and 1 brakeman killed, engineer and 1 brakeman injured. Air brakes were in use on 5 of the 16 cars in the train. The report says they "did not work."

And 3 others, on 3 roads; 1 to a passenger train and 2 to freight trains.

UNFORESEEN OBSTRUCTION.

1st, on Cleveland, Cincinnati, Chicago & St. Louis, near Danville, Ill., engine running backwards with a caboose ran over a cow, derailing both and injuring fireman and conductor.

7th, on Delaware & Hudson Canal Co.'s road, near Gansevoort, N. Y., freight train derailed at a point where the roadbed, which rested on a smooth slanting rock, had slipped out of place. The whole train was overturned.

7th, 3 a. m., on Missouri Pacific, near Otterville, Mo., a

westbound passenger train was derailed at a point where a rail had been maliciously misplaced. The engine and several cars went down a 20-ft. bank and the rest of the train was ditched. Three trainmen and 3 passengers were injured.

7th, on Northern Pacific, near Knoxon, Mont., freight train derailed by a boulder which had fallen upon the track, wrecking 13 cars and killing a brakeman.

9th, on Baltimore & Ohio, in Baltimore, Md., passenger train derailed by a chain which lay across the track. The engineer and another trainman were injured.

11th, evening, on Baltimore & Ohio, near Staunton, Va., engine and 3 cars of a mixed train derailed by a cow. Several cars were wrecked and the engineer injured.

17th, on Natchez, Jackson & Columbus, near Carlisle, Miss., engine and several cars of freight train derailed by a tree which had been blown down across the track.

28th, on Chicago, Milwaukee & St. Paul, near Dubuque, Ia., freight train ran into a rock which had fallen upon the track, wrecking 12 cars.

And 6 others, on 6 roads; 2 passenger and 4 freight trains.

UNEXPLAINED.

2d, on Baltimore & Ohio, near Glencoe Siding, O., freight train derailed on a bridge, causing the structure to give way, 7 cars going down with it into the creek.

7th, on Chicago, St. Paul, Minneapolis & Omaha, at Duluth, Minn., sleeping car of passenger train derailed and thrown off a trestle, falling 20 ft. The car was badly damaged and about a dozen passengers were slightly injured.

9th, on Pennsylvania road, at Port Royal, Pa., a stock train was derailed and completely demolished a new signal tower. The fireman was killed.

11th, on Southern Pacific, near Verdi, Nev., freight train derailed on bridge No. 24.

14th, on Chicago, Burlington & Quincy, near Princeton, Ill., car in a freight train derailed and thrown against another freight train on the adjoining main track, making a bad wreck, in which 15 cars were destroyed and the engineer killed. A fireman was scalded.

15th, 1 a. m., on Baltimore & Ohio, near Bridgeport, W. Va., westbound express train derailed and a portion of the wreck thrown over upon a sleeping car of a work train, wrecking 10 cars. Two employes in the latter were killed and 2 mail clerks were injured.

16th, on Columbus, Springfield & Cincinnati, near Springfield, O., passenger train derailed. The engine was ditched and badly damaged, injuring a trainman.

17th, on New York & New England, at Dedham, Mass., car in a freight train derailed. One brakeman killed.

20th, on Port Royal & Western Carolina, at Verdery, S. C., engine of a freight train derailed and wrecked, and several cars also derailed. Engineer and fireman injured.

20th, on Charlotte, Columbia & Augusta, at Graniteville, S. C., engine and 2 cars of a freight train derailed. Engineer and fireman injured.

25th, on Northern Pacific, on the ferryboat used to convey trains across the Columbia River, at Hunters, near Portland, Ore., the engine of a passenger train was derailed, cutting through the deck and destroying some of the floor.

25th, on Erie & Wyoming Valley, near Dunnings, Pa., passenger train consisting of engine and 2 cars derailed and overturned while running 30 miles an hour. Engineer and fireman burned by coals from the firebox.

25th, on Savannah, Griffin & North Alabama, near Brook, Ga., freight train derailed, the engine and 3 cars being overturned. Engineer and fireman injured.

29th, on Allegheny & Kinzua, near Bradford, Pa., caboose of a work train derailed, thrown off a trestle and burned up by fire from the stove. The trestle was also destroyed. Four passengers in the caboose were injured.

And 14 others, on 10 roads; involving 2 passenger and 12 freight and other trains.

OTHER ACCIDENTS.

2d, 9 a. m., on Ohio & Northwestern, at Newburn, O., the second coach of a passenger train moving at speed struck a flat car projecting from a siding, which had been let down grade by mischievous boys. One side of the car was torn off its entire length, badly injuring 2 passengers.

18th, on Chicago, Rock Island & Pacific, at St. Joseph, Mo., dining car in a passenger train wrecked by the explosion of a steam cylinder near the centre of the car. One employé scalded.

A summary will be found in another column.

The Best Form and Application of Brake for Driving Wheels of Locomotives.

At the December meeting of the New England Railroad Club the above subject was discussed. Mr. L. M. Butler, Master Mechanic of the New York, Providence & Boston, presented a brief paper. He objected to the Westinghouse as being a rigid construction, saying that breakage of parts took place from the unyielding nature of the mechanism and the way in which the brake shoe was applied to the wheel. He thinks that the liability to derailment from broken parts dropping down is serious. The Eames vacuum he thinks preferable in that it is more elastic. The steam brake he objects to on account of leaking steam and dripping water; he thinks it practically impossible to avoid this objection.

In practice he has found no objection to applying brake shoes between the wheels.

Mr. James Howard, Manager of the Beals Railway Brake Company, read a somewhat long paper. He thought that the form of the question indicated a remarkable advance in that it showed no doubt of the propriety of using brakes on engine drivers, whereas only three years ago the Master Mechanics' Association voted in convention against the use of them.

He considered the special case of a consolidation engine with 60 tons on the drivers. Using 80 per cent. of the wheel weight, the brake pressure should be 48 tons, which, distributed equally, would give 6 tons on each driver. The question then arises as to the best way of applying this pressure. The theoretically best position for the brake shoe would be on the top of the wheel; but this is not practicable. The application of the 6-ton pressure between the wheels causes injurious strains on journals and journal boxes. Wear having

taken place in each journal box, and the parallel rods not being worn to the same extent, the relative positions of the parts are changed when brakes are applied, and the wheels are locked and skidded with a small force. This accounts for bent crank pins and broken rods. This application being, then, a bad mechanical form, the next consideration is the application of a single shoe on each wheel, so placed that all may be pulled in one direction. This requires a fulcrum somewhere on the engine frame subject to a strain of about 28 tons. All of the objections to both of these methods are overcome by placing two shoes on a wheel opposite each other, on the line of wheel centres, and dividing the 6-ton pressure for each wheel into three tons for each shoe. This is the fundamental idea of the squeeze brake, which, to be perfect, must be interfulcrumed so that the strains are self-contained, and the engine frame is left entirely free from them. The Beals brake is the only system that Mr. Howard knows of in which this is done.

Mr. Howard recommends the use of steam as the motive power for the driver brake, and his arguments for this are well known, viz., that it provides an auxiliary brake which will always be operative even if the air fails.

Mr. Pomeroy (Suburban Rapid Transit) said that there were certain considerations deduced from Mr. Howard's paper very pertinent to the case. The first is simplicity; the second that the brake shall be independent and automatically adjusted; the third, that it shall be a squeeze or clasp brake. This latter form seems the theoretically correct one. But it is a fact that, to get simplicity there must be some sacrifice of theory in all mechanical devices. The Beals brake has 284 parts as compared with 95 parts for the American brake. He said there are two forms of brake concerning which he should like some information—the clasp brake now largely used on Western roads, and another simpler form of clamp brake used on the Canadian Pacific.

Mr. Lauder (Old Colony) said that he was a good while doubtful as to the advisability of using driver brakes, but from actual experience he has decided that on the whole they should be used. He differs from Mr. Howard in that he holds that the driver brake and train brake should be operated simultaneously by one movement of the brake valve handle, and that the driver brake should be used the same as the train brake in all stops. This, to Mr. Lauder, is a somewhat new position, as for a good while he held that the driver brake should be treated as an emergency apparatus.

Mr. Parke (Westinghouse Air Brake Co.) denied that a squeeze brake is any more efficient in stopping an engine than one in which the shoes are applied to one side of the drivers. No retarding power is gained by dividing the pressure on each wheel between two shoes. It is a mechanical absurdity to suppose that one application is in this particular superior to the other.

The cam brake is not a rigid apparatus, like a wedge, between the wheels, tending to lock the wheels when the side rod is at either end of the stroke, but the force applying it is an elastic one and a constantly even pressure is brought by the brake shoes upon the wheels, the piston vibrating up and down in compensation.

With regard to the injury done to driving boxes, due to a pressure of 6 tons brought on one side of the wheel: Taking an 18-in. cylinder using 140 lbs. steam to the square inch, you get a piston pressure of 36,000 lbs. thrust on the driving wheels at each half revolution. Divide that by two; and each time you take steam on the piston of your locomotive, you get a thrust on each journal, on each side of the engine, and on each driving box of 18,000 lbs. Now, in view of the facts that engines run a good many miles and take steam on both sides of the piston a good many times an hour, and that driver brakes are only used occasionally, and that you only bring 6 tons instead of 9 on each wheel, it is easily believed that the wear arising from the use of the brake is comparatively trifling.

As for the use of 80 per cent. of the wheel weight for braking, that is a matter of opinion. After an engine has been in service and flat spots begin to appear on the drivers, the probability is that the master mechanic will conclude that a little less braking force and a little more service is the better policy.

As to the squeeze brake in general, Mr. Parke sees no objection to it unless it may be that it has so many parts. Experience has shown that the objections to the one shoe brake are theoretical, and it has been found that locomotives equipped with it do not require any more repairs.

Mr. Sinclair, from the lessons of his own experience, concluded that it is fallacious to use the engine brake as an emergency apparatus, and also that the wear of boxes and brasses has no relation to the brake.

Mr. Adams (Boston & Albany) objects to the use of a driver brake in that it demoralizes the brakemen. He has about twice as many broken cars where the driver brake is used as where no such brakes are fitted to the engines. In order to save cars we had better do without driver brakes. "While you have them on the brakemen won't do anything, and the consequence is broken cars."

Mr. Howard said that experience has shown that the two-shoe brake is more efficient in stopping an engine than the one-shoe form. A committee of the Master Mechanics' Association reported to the Niagara Falls

convention that their investigation showed a gain of 45 per cent. by the use of a squeeze brake.

Mr. Parke: The committee referred to by Mr. Howard did not say that the efficiency of the squeeze brake is 45 per cent. greater than that of the other, but that at a Burlington test one engine with the squeeze brake had stopped much quicker than one that did not have it. It has been demonstrated that if a certain force is brought by a shoe of a certain size upon one side of the wheel it exerts a retarding force equal to that exerted by two shoes, each half the size of the one and each having half the pressure.

The Affairs of the Am. Soc. C. E.

NEW YORK, Dec. 23, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The members of the American Society of Civil Engineers have recently received a circular signed by Mr. Charles B. Brush, in which, after a eulogy upon the services of the Secretary of the Society, he announces that he is ready to accept the office of Director if elected, and that he declines the various other nominations for which he has been selected.

To members outside of New York City this may appear as a very curious proceeding. In order that they may understand the situation it would be well to inform them that the Am. Soc. C. E. is incorporated under the laws of the state of New York and that the majority of Directors, as well as some other officers of the Society, must be residents of the state of New York. This will explain why the honors of office are more frequently rotating among resident members, and why the numerous candidacies are thrust upon Mr. Brush, because it was so hard to find residents who would go on the ticket this time.

His eulogy of the Secretary, being irrelevant to his own candidacy, must appear to most members in bad taste. His estimate of the intelligence of the members is not creditable to them. It reminds one of a sermon preached at the grave of a very old villager, when the preacher, desiring to memorialize his demise, gave a review of all the good things that had happened while he lived. Starting in with the invention of the steam engine, the locomotive, the telegraph, and telephone, he passed in review the great inventions and momentous issues during the lifetime of the deceased, and made it appear to the simple minds of his audience that a very remarkable man, whose virtues and abilities they had not appreciated, had gone from them. Does Mr. Brush really suppose his audience to be equally simple-minded when he tries to make them believe that the growth of the Society and other progress that would have been made in any case are the result of the efforts of the Secretary, who has for the last few years been prevented by his numerous other salaried offices from giving more than the smallest fraction of time to the work of the Society?

The question naturally arises why the Secretary did not resign his position long ago and give the Society the chance to select another without the present agitation; one who would be willing for the salary to give his entire time to the work and to the good of the Society. Let it be distinctly understood that annexed to the salary of \$3,000 there are emoluments of about \$2,000 more. Those members who are in highly responsible professional positions with no higher, if not with a smaller salary, will perhaps appreciate the shallowness of the alleged sacrifice of the Secretary. His salary and emoluments are nearly the same as that of the Secretary of the much larger British Institute of Engineers.

It should be made an issue in this election that no practicing engineer should be Secretary of the Society, and that the place should not be used for pensioning off some old practicing member and other employees who are not members. The Society is entitled to the whole time of the Secretary, with as much right as the British Institute of Engineers has to the services of its own honored Secretary. A clause should be inserted in the By-laws forbidding the Secretary from engaging in professional practice; and there should be a further law increasing his salary from \$3,000 to, say, \$4,500, and let him reside in New York City where he pleases, except in the house of the Society. It is none too large, and all the room could be more profitably used for Society purposes.

It is most remarkable that the present Secretary, socially so well thought of probably by every member who has the pleasure of knowing him personally, should have declined the honor of a Vice-Presidency, a position where his peculiar knowledge would have continued to be of the most good to the Society, and that he should have selected the Treasurership without any apparent good reason or sense. This appears to many members as a very curious matter, for which Mr. Brush's circular gives no satisfactory explanation. No good reason has appeared yet for the combination of the present Secretary as Treasurer and another practicing engineer as Secretary.

ONE OF MANY REFORMERS.

Creosoting Timber.

BY AN ENGLISH ENGINEER.

Creosoting has both a chemical and a mechanical aspect. Chemically it may be looked upon as a process which renders wood fibre distasteful to fungoid growth

or boring worms and insects, the material being fatal to such types of vitality. Mechanically, certain forms of creosote act like so much wax or paint, filling up the pores of the wood and thereby preventing the access of water or air. Clearly the mechanical effect can only endure while the creosote continues in the pores. When the mechanical process has been only half carried out the tie is protected upon its exterior surface and to a depth inward of half an inch and upward, according to the extent to which the process has been carried. The process of creosoting is, therefore, one requiring care in the selection of a chemically proper creosote and in the mechanical process by which such creosote is put into the timber.

In its earlier days the term creosote was applied to that distillate from coal tar which came over after naphtha and left pitch behind. Now very often the term seems applicable to the distillates from shales or the products of blast furnace gases. Strictly speaking, the proper oil to use is the coal tar distillate, the other sources not securing such properties in the oil as are necessary to success.

As regards the mechanical application of creosote, the method which seems best to employ is to place the timber to be treated in a long cylinder not unlike a steam boiler. Air is exhausted from this vessel by a pump, and the oil, heated to from 95 to 120 deg. F., is admitted into the vessel and pressure applied to force it into the pores. Mr. Boulton, a large creosoter in London, continues to exhaust air and steam after admitting the creosote, and this he heats to the temperature of 212 deg. or more. In this way he is able to treat wet, unseasoned timber, for its moisture is evaporated by the heat and pumped out as steam. There is an objection to the heating to even so high a temperature as 212 deg. on account of the liability of overheated timber to become brittle, and it should not be overlooked that in a vacuum of 12 lbs. below atmosphere the boiling point of water is below 150 deg., and that a moderate heat of 150 deg. would be sufficient to expel all moisture without chance of damage by overheating. In any case when exhaustion is complete the atmospheric or a higher pressure must be admitted to allow of the entry of the oil into the pores now left empty by the shrinkage of the attenuated gases and the condensation of the steam still residual. The process of exhaustion and pressure can be repeated if necessary. Mr. Boulton puts on after exhaustion as high as 120 lbs. per square inch of pressure, and limits the temperature to a maximum of 250 deg. This certainly is an outside limit. It may be well to use this high temperature in the cylinder to effect rapid vaporization of the water, but it is open to question whether in vacuo 150 deg. more prolonged is not sufficient, especially if the timber be required for structures involving strength, as bridges.

One thing seems certain, a piece of timber can only be said to be properly treated when it is penetrated by the creosote to its very centre. Where complete saturation has not been effected, it is only a matter of time for cracks to develop and fungi to grow upon the untreated portions thus exposed. There is, when looked for, sufficient evidence to prove that timber which has been creosoted many years and exposed to weather, and is still quite sound, has evidently been prepared with such a quality of creosote as has remained permanently within the pores of the wood, while timber which has been creosoted and afterwards has rotted would appear to have in it nothing of the solid matter found in the preserved specimens, while in no case does there appear to remain anything of the volatile tar acids, such as carbolic, which, from its known antiseptic property, has been largely credited with being the preserving principle in creosote.

Such being the case, then, it is rational to suppose that it is the less volatile solid substances which are of permanent value, and to American engineers this is of special note, for in a climate of such high summer temperatures it is certain that the preserving effect of the more volatile constituents of creosote would be sooner lost than in a cooler climate. There is no room to doubt the value of the process when properly carried out with oils of proper chemical composition.

Now the question arises, What is creosote?

There is no substance which can lay claim to be termed creosote specifically in the definite sense in which we speak of lead, copper or silver. Creosote is a very miscellaneous mixture of various substances produced in the distillation of coal. When coal is distilled gas is produced and a liquid tar. This liquid is capable of distillation, and it is of a most complex composition and of a specific gravity of 1.1 to 1.2. Coal tar is distilled in iron retorts, the heat applied being gradually increased, and even the fractional distillation thus practiced is capable of being considerably varied and producing a different class of secondary mixtures, according to temperature. In the following table, given on the authority of that distinguished analyst, Allen, are shown three methods as practiced at three different works. An inspection of this table is very instructive as showing the various mixtures possible.

The higher the temperature has been allowed to proceed before taking off any special distillate, the heavier will be the next resulting product on further increase of heat. Now, a creosote of class A will contain a great deal of carbolic acid, that of class C will contain much less, while that of class B will be a creosote which modern

(Continued on page 898.)



Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A freight trainman, when called into the superintendent's office recently to explain an infraction of the rule limiting speed at a certain point, offered, as one of his principal arguments, the statement that nothing to call attention to that rule had been posted on the bulletin lately. We do not know how many brakemen or conductors have the audacity to present that excuse openly, but everybody knows that it is in the minds of a good many men when they find themselves cornered, and that its presence there heightens their feeling that they are being abused, if any punishment is inflicted. The incident calls attention not only to the fact that the issuance of such notices is very common, but that they may in the long run do harm instead of good. The ill effect of issuing a notice and then, when it is disregarded, issuing another one calling attention to the first, is readily understood when it is borne in mind that such a practice ignores the essential difference between preaching and teaching. The former is based on politeness, the latter on force. Preaching fires words at a man (if we except the kind that fires over his head), but has little to do with his reception of the ideas they embody; teaching does this, and, in addition, demands and gets an answer. In a train order the dispatcher follows the "teaching" idea and (theoretically at least) in the fullest sense. In trying to secure more tidiness of dress in a passenger conductor, whose pride it is not deemed discreet to wound, or to get an employé to perform some additional work which really will warrant an increase of his pay, but which had better go undone unless he will do it cheerfully without more pay, the other principle is followed; the employé is given to understand that he may consult his own desires about complying. Is it not time that many of the important matters which constitute the subject matter of bulletin-board circulars be taken out of the "may" and put in the "must" class? These notices are indeed often phrased in imperative language, but trainmen are like other people, and they judge a superintendent by what he does more than by what he says. If an order is not enforced, it is of doubtful value, even if it be repeated on the bulletin board in red letters every month; while, if it is enforced, a fine-print paragraph on the last page of the instruction book will be effective.

The noticeable features of the Michigan Central passenger station illustrated in another column are the second story and the absence of a platform roof. The slight projection on that part of the building containing the ladies' room, and the roof which connects the main building with the baggage room afford considerable protection, and it remains to be seen how serious will be the inconvenience of doing work out in the rain at such a large station. We do not know the motive in leaving the platform uncovered, but one of the principal results, and a gratifying one, is the more

pleasing effect as one views the building at a little distance off. A long and low roof almost inevitably mars the beauty of a station. On the other hand, the porte cochère on the side toward the street adds to the massive and imposing appearance of the building, the architect being here at liberty to consult the best effects without restriction. In adding a porte cochère the company follows the fashion established by the aristocratic roads of the "effete east," and makes somewhat of an innovation for the west. The cities in that region are, however, growing very rapidly. A two-story building is so much handsomer than the low ones usually put up for passenger stations that there is no comparison between the two. The designers can, if they will, relieve the toad-stool appearance of one-story buildings to a considerable extent, but they often fail in the attempt, and their remedies are somewhat costly at best. A comparatively plain two-story building is likely to be more satisfactory than a scrimped, one-story affair, relieved by towers and projections, and it is therefore to be hoped that higher buildings will be more generally introduced. The obstacle to this is, of course, the cost, but that is not insurmountable. The Bay City building cost about \$10,000 more than what would have been necessary for a similar one of only one story; but the upper rooms here were needed and were finished in first-class shape, with hot water heating, plumbing, etc. To put on the second story and leave it unfinished the architect estimates would have cost only about 12 or 15 per cent. more than for a one-story building. Assuch upper rooms can generally be rented for some purpose, a railroad is quite as likely to make as to lose money by spending a small extra amount for aesthetic effect. This is not an untried idea, as many of our readers know.

Uniform Classification.

There seems to be a hitch in the progress toward uniform classification. The trunk lines are the ones that are holding back. We do not know enough details to pass judgment on the merits of the question; but there are plenty of reasons why the trunk lines must naturally wish to go slow in this matter.

In the first place, they probably have their hands less free to make changes, even when they wish them. If a region is densely settled, its traffic assumes a more stable character. Different industries adjust themselves to their conditions, so that almost any change produces more burdens than it relieves. In a comparatively new country where everything is changing, people are much better prepared for one or two additional changes than in an old country, where stability is the rule, and any change a glaring exception. The opposition which a road encounters from vested business interests is not so noisy as that from a legislature, but it is in the long run vastly more effective.

Again, in a new country, where rates are being rapidly reduced for the sake of a growing traffic, the railroad men can do things which are much harder where rates are stable and traffic has more nearly reached its limit. An eastern road cannot readjust its classifications without actually putting rates up on many articles. The difficulty of doing this has caused the retention of almost absurd practices. The business between New York and Boston is much of it done on what is fundamentally a space tariff. The roads at the outset adopted the system of charge in use on the Sound steamers, and have never been able to change it, much as they would have liked to do so.

With a set of local usages which they cannot change if they would, the managers are naturally reluctant to adopt a joint classification based on the demands of wholly different regions. It is probable that they carry this reluctance to an unwarranted extent. The New York roads have got so into the habit of giving commodity rates that they overrate the difficulties of uniformity. But their western connections almost certainly underrate those same difficulties. There is danger in going too fast, as well as in going too slow. If you try to hasten nominal uniformity, you may cause so many commodity rates to be given openly, and so many special rates secretly, as to defeat your own end.

The first point is to live up to your classification and rate sheets, such as they are. The second point is to have your classification as uniform and your rates as simple as you can live up to. But in our anxiety for simplicity and uniformity we sometimes forget the practical difficulties of living up to them. The Interstate Commerce Commission quite generally does; and not a few of our railroad men are influenced by its example. The creation of an advisory board without joint agencies is one example; the effort to force uniform classification on a group of reluctant roads is very

much after the same sort. It is like adding on to the top of a structurally weak dam.

We do not lay so much stress as some people on the argument that, if the railroads do not adopt a uniform classification, Congress will. In the first place, nobody can exactly predict what Congress will do; and even if they could, we may as well let Congress have the responsibility for its folly and not try to shoulder it ourselves. When sagacity in business management is to be forcibly reduced to the congressional level, this will be a good country to emigrate from.

The Economy of Safety.

A "statistician" has estimated that if a man lives in India 60,000,000 years he will be eaten by a tiger; but no one will hesitate about going to India on this account. On the other hand half of a regiment has been killed or wounded in battle in 15 minutes; and no one would go to war for his health. Between these two extreme examples of probable danger to life and limb there is somewhere a line at which the average man will hesitate before taking the risk. But that line is a vague one, and it is often a question what one can afford to spend in money or in trouble, for insurance.

An Englishman who has a wide and minute knowledge of English railroads, and who has written much and acceptably about them, makes a suggestion that is startling, coming from an Englishman. It is that the English railroads may have spent too much money for safety appliances—that if they spent less they could afford to work cheaper. His letter appears on another page, and we need not reproduce any part of it here. Of course there is an economical limit to expenditures for safety, but we doubt if that has been reached in England, and we are sure that it has not been even approximated on any road in America.

Mr. Acworth speaks of the great cost of English railroads as a reason why they cannot work cheaply. Cost which piles up fixed charges without a corresponding reduction of operating and maintenance expenses is, generally speaking, a waste of money, but safety appliances are only one element in the great cost of English railroads. They have cost more than ours because of parliamentary expenses, greater cost of right of way and real estate, more expensive terminals, more stable permanent way, and, to some degree, because grades and alignment are not kept so close to the natural surface as in this country. Expenditures for safety appliances have, of course, been heavy in a country where 90 per cent. or more of all the lines doing passenger business are interlocked and blocked signaled. Operating expenses are increased also by the wages of the signal men and the maintenance of the plant; but are they not, on the other hand, reduced by the facility and security of traffic which these very safety appliances give? And is all the cost of establishing, maintaining and operating them to be treated simply as so much spent for insurance against loss of life and injury to persons?

Interlocking apparatus, for example, is more often than not an element of economy in handling traffic—directly in enabling fewer men to do a given amount of work, or indirectly in enabling more work to be done in a given space, or still more indirectly in saving accidents. Of course at grade crossings and small junctions an interlocking plant often involves the wages of a man where none was employed before, and in such cases the saving becomes speculative; but even then, roads with heavy traffic now put in interlocking without stress of law or public opinion, simply to save precautionary stops and to protect their trains from those of their neighbors.

Block signals may or may not be directly economical. This must be decided by the conditions of each special case. When a road is worked about up to the limit of its capacity the only way to get the maximum work out of track, rolling stock and train crews is to run trains by space intervals, and then it becomes a nice problem to proportion the length of the block sections so that the cost of signaling shall be a minimum, and the traffic not be delayed instead of being facilitated. On the whole we believe that all American roads that have tried a block system are satisfied that even a non-automatic system is economical in the end if the traffic is heavy.

The ultimate economy of air brakes on freight cars is still doubted by some operating officers, who foresee great trouble and expense in maintaining them, but the number of those who believe that this means of safety is also one of economy is increasing daily with its more extended use.

In brief, there is hardly a measure of safety in use on the railroads which is not one of economy either in expediting traffic or saving wrecks. Even heating by

steam from the locomotive, which was first actively urged for the sake of safety, will probably be found cheaper and more convenient than the more dangerous methods.

Of course we agree with Mr. Acworth that some risk must be run in railroading, and that one can pay too dearly for safety; but we do not think that the railroads of the United States are in danger of any such extravagance. They can give good service at low rates, not because they do not use well known mechanical aids to safety, but in spite of that fact.

Nominal Rates and Actual Earnings.

Many papers which ought to know better gravely figure upon the increase in gross earnings which would result from an advance in rates. They take the ton mileage as reported during the past year, and calculate what would be the effect of a charge of one mill additional upon the whole; and they add this as a lump sum to net earnings. They then go on to reason that if an advisory board can issue an order for this advance, financial prosperity of railroad investors will be assumed.

It is hardly necessary for us to point out how wholly wrong this reasoning is. Any railroad man knows that an advance in nominal rates reduces the volume of traffic. Some of it goes by water; some goes shorter distances; some does not go at all. Within moderate limits, gross earnings are apt to increase with lower rates, rather than with higher ones: the loss of profit arising rather from the increased percentage of operating expenses.

It makes a great difference with the financial results whether the average receipts are raised by abolishing special rates or by increasing nominal rates. In the former case, almost everything is a clear gain. A rebate, if made on only part of the business of a given character, is so much dead loss to the railroads. It represents business stolen by one shipper from another. The aggregate volume of traffic is determined by the nominal rate. The rebate gives one shipper a larger share of this total business at the expense of his competitor. If various roads are at war, one may perhaps gain by giving rebates; but the roads as a body lose almost, if not quite, the entire amount of the favors thus given.

If one mill per ton per mile could be gained by the abolition of special rates, almost the whole amount would thus make itself felt in increased net earnings. But the action of an advisory board is not going to accomplish this. In one sense it is going to make it more difficult of accomplishment. The larger the margin of profit left by the nominal rates the greater the temptation to dishonest roads, to cut rates secretly. An advisory board, with joint agencies to execute its bidding, or with a division of traffic to prevent the individual roads from defying it, might accomplish something. But without these aids it may cause positive loss instead of gain.

There is one evil, which, from the standpoint of honest railroading and honest business alike, is worse than all the rest put together. This is personal discrimination under precisely similar circumstances. If we can check this we do at least reasonably well. If we do not check it, all other measures are quite as likely to do harm as good. Any increase of nominal rates, so far from producing the effect desired, would hurt the honest shipper, hurt the railroad, and simply give a greater margin for rebates and special privileges.

November Accidents.

Our record of train accidents in November, given in this number, includes 111 collisions, 90 derailments and 3 other accidents, a total of 204 accidents, in which 66 persons were killed and 265 injured.

These accidents are classified as follows:

COLLISIONS:	
Rear.....	30
Butting.....	31
Crossing and miscellaneous.....	21
DERAILMENTS:	
Broken rail.....	1
Loose or spread rail.....	5
Broken bridge.....	7
Defective switch.....	4
Defective switch lamp.....	1
Defective frog.....	2
Broken wheel.....	5
Broken axle.....	6
Bent axle.....	1
Broken truck.....	2
Broken brakebeam.....	2
Misplaced switch.....	5
Unfastened switch.....	1
Runaway train.....	3
Bad loading.....	1
Track repairs.....	1
Cattle on track.....	4
Landslide.....	3
Malicious obstruction.....	1
Accidental obstruction.....	3
Purposely misplaced switch.....	2
Unexplained.....	28

OTHER ACCIDENTS:

Explosion in car.....	1
Miscellaneous.....	3
Total number of accidents.....	
204	
The causes of collisions, where given, were as follows:	
Trains breaking in two.....	Rear. But-Crossing ting. and other. Tot'l.
Misplaced switch.....	6 2 8
Failure to give or observe signal.....	5 3 8
Mistake in giving or understanding orders.....	13 2 15
Miscellaneous.....	8 8 16
Unexplained.....	10 5 15
Total.....	
39 31 21 111	

A general classification shows:

Defects of road.....	Col- Derail- Other. Total P. c.
Defects of equipment.....	20 20 20 10
Negligence in operating.....	8 16 2 26 13
Unforeseen obstructions.....	56 12 3 68 34
Unexplained.....	14 1 15 6
Total.....	
111 90 3 24 100	

The number of trains involved is as follows:

Passenger.....	Col- Derail- Other. Total P. c.
Freight and other.....	43 31 2 76 24
Total.....	
218 91 3 315 100	

The casualties may be divided as follows:

KILLED.....	Col- Derail- Other. Total
Employes.....	23 21 1 44
Passengers.....	9 1 1 11
Others.....	2 10 1 13
Total.....	
34 32 2 68	
INJURED.....	Col- Derail- Other. Total
Employes.....	75 49 1 125
Passengers.....	81 2 2 85
Others.....	2 2 2 6
Total.....	
156 106 3 265	

The casualties to passengers and employes, when divided according to classes of causes, appear as follows:

Defects of road.....	Pass. killed. Injured. Emp. killed. Injured.
Defects of equipment.....	1 30 8 13
Negligence in operating.....	3 3 1 7
Unforeseen obstructions and maliciousness.....	9 89 30 89
Unexplained.....	16 5 2 12
Total.....	
10 138 14 125	

Thirty-four accidents caused the death of one or more persons each, and 64 caused injury but not death, leaving 106 (52 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with November of the three previous years shows:

Rear collisions.....	1890. 1889. 1888. 1887.
Butting.....	30 37 40 52
Crossing and other collisions.....	31 21 21 19
Derailments.....	21 17 10 2
Other accidents.....	90 73 70 48
Total.....	
244 151 145 125	
Employes killed.....	44 30 25 38
Others.....	22 13 13 5
Employes injured.....	125 90 106 87
Others.....	140 77 73 18
Passenger trains involved.....	76 50 51 36

Average per day:

Accidents.....	6.80 5.63 4.83 4.17
Killed.....	2.20 1.40 1.27 1.43
Injured.....	8.83 5.56 5.97 3.50

Average per accident:

Killed.....	0.323 0.278 0.262 0.344
Injured.....	1.299 1.106 1.233 0.480

The most fatal accident of the month was that caused by the failure of a bridge at Kansas City, on the 17th. An account of this was given in the *Railroad Gazette* of Dec. 19. The collision at Rock Cut, N. Y., on the 3d, caused the death of four trainmen. The cause of this accident was discussed in the *Railroad Gazette* of Nov. 14. The New York Railroad Commissioners confirm what was said at that time by censuring the railroad company for employing a 17-year-old boy in a responsible position. The elements involved in the application of the true remedy, the settlement of the question why the roads have inexperienced men, are still waiting to be aired, however. Every one generalizes by saying that boys and girls are employed to save money. But, admitting that railroads are thus blind to the best public policy (and often blind to their own immediate interests), how is the mistaken practice to be stopped? This is what a railroad commission ought to tell us. And a comprehensive remedy involves a good deal more than a simple law prohibiting the employment of persons under a certain age. Youthfulness was not the only incapacitating element in that boy's character.

One of the accidents most fatal to passengers was the collision near Carbondale, Pa., on the 5th. The conductor and engineer in this case were guilty of the blindest forgetfulness, and they were indicted on a criminal charge. The engineer fled from the state and has not been arrested. The conductor was tried, convicted and sentenced to 30 days' imprisonment and \$25 fine. While any intelligent conductor ought to be able to study the rule book very effectively in 30 days, and thus firmly fix in his mind the moral to be learned from such a piece of reckless conduct, we are at a loss to account for the mildness of the sentence. Similar consequences from other crimes more familiar to the courts and the lawyers would almost certainly bring down a heavier penalty. This lesson will not be likely to make much of an impression on the other conductors of the country.

Half a dozen other collisions of this month are notable, on account of a variety of circumstances. At

Tribes Hill, N. Y., on the 7th, the possible danger in the practice of calling in flagmen by whistle signal was illustrated at the expense of several hundred dollars. Although the Time Convention may have done its duty in calling attention to the problem of making this rule a safe one or else substituting something else in its place, it is clear that individual roads have a duty in taking practical action. It will be recalled that last year eight passengers were killed in a collision which quite likely resulted from a complication caused by the insufficiency of this rule. In the butting collision at Edwardsville, Ala., on the 10th, one of the trains was running slowly because "the engineer did not know the road thoroughly," and he passed the station named in his meeting order by about a mile. The particulars given concerning the butting collision at Scott, O., indicate that the runner of the engine, which was standing on the side track, must have been asleep. The same appears to have been the true cause of the rear collision, near Elkton, Minn., on the 14th.

Another case where sleeping on duty resulted in serious damage was that at Palmer, Mass., on the 29th, in which a troublesome wreck apparently might have been prevented but for the laziness of a signalman. Being familiar with the theory that the normal position of signals is at danger, he followed it out by assuming that a recumbent and somnolent position was the normal one for himself.

The rear collision at Glen Alice, Ala., on the 24th, was made specially disastrous by the ignition of oil, and two other wrecks were made very costly by the same cause, one at Oil City, on the 4th, and one at Olyphant, Ark., on the 26th. The immediate cause of the latter is one which needs to be guarded against in every accident to an oil train.

"Failure to give or observe signal" is responsible for an exceptionally large number of collisions this month, and three of these were upon roads using the block system; to wit, those at New Florence, Pa., 14th; Greenwich, Conn., 24th; and Nutley, N. J., 26th. The rear collision at Trenton, N. J., on the 6th, was also on a road of this character, but was apparently caused by careless running on a short stretch of track where absolute blocking was not at the time in force. The first derailment under the head of "defects of road" was from a cause which has rarely, if ever, appeared in the list before. There was a similar failure of a colored glass in a common switch lamp in Massachusetts a year or two ago, but no great damage was done. Now we have the injury of three railroad officers, and apparently a stroke of good fortune is all that prevented a more serious outcome.

Near Millersburg, Ky., on the 13th, five trackmen were injured, two or three of them fatally, by being struck by a train while they were running a hand car during a dense fog. On the 9th, near Minter City, Miss., three laborers on a work train were thrown off the cars and killed by the sudden reversal of the engine. On the 9th a small panic was occasioned on a New York City elevated train by the derangement of a lamp in such a manner that it was enveloped in flames and had to be carried out through a crowd of people in order to save the car from taking fire. Near Owen Sound, Ont., on the 5th, an engine, which had helped a freight train up a long grade returned to its starting point on the time of a passenger train and collided with it, killing the freight engineer. It would appear that the block system is not in effect on that part of the Canadian Pacific.

The most important news in connection with the proposed new agreement of the roads west of Chicago is the announcement that the Illinois Central directors have approved it. President Fish says:

In 1888 the Illinois Central refrained from joining the Interstate Commerce Railway Association, chiefly because that would have required the delegation of the rate-making power to a commission of experts who were neither members of its Board of Directors nor selected by that board. The charter requires the directors to establish rates by law, and the Supreme Court of the United States have construed that part of the charter most literally. A minor reason was that the territorial jurisdiction of that association made the Illinois Central an eastern bulwark protecting the traffic of the roads south and southwest of Chicago without affording to it any protection against the roads crossing or lying east of it. For a time the Interstate Commerce Railway Association accomplished much good, but it failed to secure the objects aimed at. Now we are confronted with a recurrence of like conditions, and there is presented a plan which recognizes the power and duty of the directors of the several companies, through committees of conference, chosen from and by each board, to establish the tariffs for competitive traffic. We accept this as lawful and wise, the more so as it vindicates our known policy and practice.

Thus far seven roads have ratified the agreement. Following are the names of their chosen representatives:

Missouri Pacific.—President Jay Gould and General Manager S. H. H. Clark.
Northern Pacific.—President Thomas F. Oakes and Director David S. Wegg.
Chicago, Rock Island & Pacific.—President R. R. Cable and Director Benjamin Brewster.
Chicago & Northwestern.—President Marvin Hughitt and Chairman Albert Keep.
Atchison, Topeka & Santa Fé.—President Allen Marvel and Chairman George C. Magoun.
Denver & Rio Grande.—President David H. Moffat and Chairman George Coppel.
Rio Grande Western.—President William J. Palmer and General Manager David C. Dodge.
Wabash.—President O. D. Ashley and General Manager C. M. Hays.

The directors of the Illinois Central have practically

ratified the agreement, but have not yet selected a director to act with President Fish in the advisory board.

Four of the Vanderbilt lines, the New York Central, the "Big Four," the Lake Shore and the Michigan Central, have this week formally ratified the advisory council agreement printed in the *Railroad Gazette* Dec. 19.

Representatives in the proposed advisory council were chosen by the directors of the companies named, as follows:

New York Central.—President Depew and Cornelius Vanderbilt.

Cleveland, Cincinnati, Chicago & St. Louis.—President Ingalls and J. Pierpont Morgan.

Lake Shore & Michigan Southern.—President Newell and H. McK. Twombly.

Michigan Central.—President Ledyard and William K. Vanderbilt.

While the newspapers and commercial bodies of Boston are clamoring for faster trains between that city and the metropolis, bringing up arguments to show that 5 hours instead of 6, the present minimum time, would be a reasonable speed, and referring to the numerous fast trains run under the stimulus of sharp competition and very large traffic between New York and Washington, the Boston & Albany comes out with a new time table, lengthening the time of its night train from 7 hours to 7 hours and 41 minutes. At the same time the weight of the train is diminished, an independent train for the mail and express cars being now run through in both directions just ahead of the passenger train. The reason for the slackening of speed is therefore not readily apparent. Quite likely the great majority of the passengers are ready to start at 11 p. m. and are not specially anxious to reach their destination before 6:40 a. m.; but the move is nevertheless a backward one. The rival train, that over the Shore Line, does not start until midnight and is due at destination at 7 a. m.; so that if its locomotives are able bodied it can point the finger of scorn at the Boston & Albany. It is noticeable that the Bostonians and others who want 5-hour trains have no idea what they are asking for and present no arguments of any weight. They simply know that 227 miles can be covered in five hours, and so demand that it be done for them. There is no obstacle in the way but expense, and that, of course, the railroads can remove by a stroke of the pen. The fact that there is an enormous amount of other traffic between New York and Philadelphia, which helps pay for the block signaling, the third and fourth tracks and other costly facilities; that the ground is level, while Massachusetts and Connecticut are hilly, and that New Jersey and Pennsylvania, Delaware and Maryland permit trains to run a mile a minute over highway crossings, while Massachusetts expects millions of dollars to be expended in abolishing this danger—these and other important matters are not once thought of. It is true that money can easily provide safe 5-hour trains between New York and Boston; but it will take a good deal of it.

The idea of placing signs in passenger cars to indicate the next station (the signs to be changed by the trainmen as the stations are passed) is an interesting one, and has been several times put in practice, experimentally; but the trouble and expense, coupled with the comparatively small advantage, has always kept down the enthusiasm of practical railroad officers. Finally, however, a scheme is announced which seems to have an element of success. It is described by a Canadian correspondent as follows:

The Grand Trunk Railway Co. are introducing a station indicator over their whole system. A nicely finished frame of polished wood, placed in prominent view at both ends of the car, contains a number of thin iron plates, each plate painted with the name of a station in characters legible in any part of the car. The names of the stations are placed in the order in which the train passes through them. As each station is passed the conductor pushes a lever on the indicator, a gong sounds, and the previous plate drops, bringing into view the words: "The next station is —," whatever the coming place may be. This is repeated after every station, so that a passenger has only to look at the indicator to discover at any time the name of the town or city which the train is approaching. Mr. Allison, of Montreal, has received a contract permitting him to fit up every passenger car on the Grand Trunk system, both in Canada and the United States, with these instruments.

There being no indication in this of superior feasibility, we made further inquiry, and lo! the secret spring is revealed. The reverse sides of the tablets, which occasionally bob up, are to contain advertisements. Here we have the magic wand that turns ordinary stuff to gold. Great is the American advertising agent.

General Poe has completed the plans and specifications for the new lock at the Sault Ste. Marie Canal. It is to be 800 ft. long, 100 ft. wide and available for vessels drawing 20 ft. of water. The approximate quantities of masonry are cut stone, 20,000 cu. yds.; backing, 50,000 cu. yds., and 5,000 cu. yds. of concrete. The work is to be commenced by May 15 next and wholly completed by Nov. 15, 1893. The estimated cost of this work is about \$4,750,000, and at the last session of Congress \$900,000 was appropriated with permission to let a contract for the whole work, instead of following the usual plan in appropriations for public works of only letting so much work as the engineer estimates can be done with the appropriation in hand. This, as the *Railroad Gazette* has shown (March 4, 1887), will probably save in interest

and contingencies fully a million dollars over the cost if the estimated time of 10 years was to be occupied in building the lock.

The original canal, built under a state charter, had two locks of 9 ft. lift each which were 350 x 70 ft., with 11½ ft. on their mitre sills. The first boat passed through June 18, 1855. The general government bought the old canal, and commenced the present single lift lock, 515 ft. x 80 ft., with 17 ft. on the mitre sills, in October, 1870, and passed its first boat through Sept. 1, 1881. The commerce of the lakes adapted itself to the increased depth so fast that during the season of 1883 only 11 per cent. of the vessels using the canal could be passed through the old locks. It is doubtful if the new lock will make such a change in the draft of lake vessels, as the steamers now built are too valuable to be discarded, and there are many harbors which will require deepening.

A committee of the Western Passenger Association has reported in favor of abolishing all unlimited tickets after March 1 next, but the report is singularly brief considering the importance and magnitude of the subject. Such a move would be quite radical, if indeed it were not impossible under the laws of various states. The courts have quite uniformly decided that a ticket can be limited to a certain date and to a continuous passage only in case a consideration is given the passenger, and the resolutions of this committee have nothing to say about a reduction of fares. It will be remembered that General Passenger Agent Edwards of the Queen & Crescent Route recently called the attention of the passenger men of the country to desirableness of the proposed reform, as regards joint business; and in a large share of that business the change is not only desirable but very probably practicable, for through rates can be profitably reduced a sufficient amount to warrant limitations in the ticket; but to apply it at a single stroke to all "local and through" business, as this committee specifies, would be a big undertaking; and the basis of the idea which the committee intends to present is not clearly apparent.

Secretary Hill, of the National Association of Car Service Managers, has issued a summary of the work of the 26 associations in the country for the quarter ending Oct. 31. The total number of cars handled is 1,703,343 and the average detention 1.74 days, a trifle more than the time shown for the preceding quarter. The lowest average is shown by the Cincinnati Association, 1.23 days, and the highest by the Louisville, 2.80 days. For the preceding quarter two associations reported an average of over 3 days. The low general average and the uniformity of the averages at a large number of places seem to indicate relaxation of the rules or of the principles on which the computations are made. The Grand Rapids Association, which showed the lowest average in the report before this one (1.07 days), reports for the month of September 6,300 cars handled with an average detention of only .97 days.

Mr. John C. Trautwine, Jr., has taken up his residence at Stamford, Conn., thus becoming a resident member of the American Society of Civil Engineers to meet the technical objection that some people have raised that he, as a non-resident member, is not an eligible candidate for the office of Secretary of the Society. It has already been shown very conclusively that this point is not well taken, but that a non-resident is eligible to the office. Mr. Trautwine's action may, however, meet the objections of some members of the Society. If he is elected he will, of course, reside in New York City.

The Standard Code on the Chesapeake & Ohio.

General Superintendent G. W. Stevens, of the Chesapeake & Ohio, has issued a new book of train rules to go into effect Jan. 1. The Time Convention standard is very closely followed so far as it applies, and the other rules are in the same general style as those of the Pennsylvania, noticed in the *Railroad Gazette* Oct. 25, 1889, and are, to a large extent, copied from them. The diagrams showing the manner of attaching flags and lamps to the front and rear of trains are printed in the book the same as in the standard code, but the diagrams of hand signals which appear in the latter are not shown in the Chesapeake & Ohio. Some of the motions are very poorly shown by the Time Convention pictures, and there is therefore very little loss in omitting them; but there are several roads which make use of cuts showing the motions as they should be shown, and it is to be regretted that this or any other code appears without such diagrams. It is still more to be regretted that many roads which print the diagrams fail to enforce compliance with them.

From a cursory examination of Mr. Stevens's code we note a few of the features in which it varies from the standard. Supplemental paragraphs are printed after rules 8 and 10, enjoining care in coupling and in getting on and off cars, and prohibiting the use of intoxicating liquors. These rules are well and briefly put. Watches must be examined every three months. Rule 20 requires chief train dispatchers to get receipts for new time tables. Bell cord signals are entitled "whistle cord signals." Rule 64 gives the general rule for switch targets. Rule 78 is in heavy type. Rule 84 tells about running on double track. The time interval

between trains is 10 minutes. Rule 89 a, which is an addition of doubtful advantage, is intended to strengthen the preceding rules in cases of storms or fogs. Rule 91 is strictly according to the standard code; 91 a refers to long passing sidings. Rule 93 a requires the exchange of identification cards by trains of the same class when they meet. Rule 95 a is as follows: "Switch engines working in any yard or at any station must not occupy the main track on time of a delayed passenger train without special orders." This ought to be prefaced by the Erie rule on this subject.*

Rule 97 requires the flagman (in the first case specified) to go back 50 ft. Rule 97 a requires freight trains to be under control at all stations. Rule 99 a prescribes "10 telegraph poles farther when on a curve or down grade;" 99 b requires the train to move forward slowly if there is not a clear view when the flagman is called in.

Rule 106 a provides that when a train loses its rights between telegraph stations it may be helped along by another train which overtakes it with special orders; in other words, the second train, having more rights than the first, can use them to cover both trains. This is the rule which was discussed at the Superintendents' meeting, and reported in the *Railroad Gazette* of Oct. 24, page 738. It will be remembered that it had been laid before the Time Convention Committee and rejected. Rule 113 a allows work trains to occupy the main track on the time of freight trains. Rule 114 is as follows: "A train approaching a station where a passenger train is receiving or discharging passengers must be stopped before reaching the passenger train." This and some of the other changes are copied from the Pennsylvania code, apparently.

The block signal rules (200-214) are somewhat different from those of the Pennsylvania. A "green caution card" is used when absolute blocking is suspended. Trains "must not pass block signals when shown at safety unless they have a right to the road," which means, we suppose, that meeting and other orders, and time table rules concerning inferior and superior trains, must take precedence over the block signal rules.

The chief train dispatcher issues telegraphic orders in his own name. "Switchmen" is the name given to switch tenders, which seems to conflict with the edict of the great "labor leaders" of this country, who apply that name to yard conductors and brakemen. Rule 517 a requires conductors and engineers to exchange orders if they change trains. Rule 519 has a supplementary paragraph enjoining caution in using the rule. Rule 521 a requires operators to get the conductor's signature before acknowledging an order, provided the conductor is at the station. Rule 524 a requires operators to keep trains 10 minutes apart by the train order signal.

NEW PUBLICATIONS.

The Civil Engineer's Pocket-Book, etc., etc. By John C. Trautwine, C. E. New York: John Wiley & Sons, 1891. Price \$5.

"Trautwine" for 1891 marks the fifteenth edition and fortieth thousand. While the change is little in any one edition of this indispensable work, which is the engineer's memory and conscience in one, yet it has undergone great changes in the past six years. None is more important than the substitution of formulae for rules unless it is the explanation of theories by examples. The principal additions to this edition are to be found in the article on weirs and in that on centrifugal force.

Creosoting Timber.

(Continued from page 895.)

ideas point to as being superior, as a preservative for timber, to the lighter oils. Chemically, more is known of those products of coal tar which have the lowest boiling point.

A.		B.		C.	
Temp. of distillation, °C.	Product.	Temp. of distillation, °C.	Product.	Temp. of distillation, °C.	Product.
0 to 170°	Crude naphtha.	0 to 110°	First light oils.	0° to 110°	Light naphtha.
		110° to 210°	Second light oils.	110° to 170°	Light oil.
170° to 270°	Heavy, dead or creosote oils.	210° to 240°	Carbolic oils.	170° to 225°	Carbolic oils.
		240° to 270°	Creosote oils.	225° to 270°	Creosote oils.
Over 270°	Anthracene oils.	Over 270°	Anthracene oils.	270° to 360°	Anthracene oils.
Residue.	Pitch.	Residue.	Pitch.	Residue.	Pitch.

That ingredient of creosote oil which appears to act as the most enduring preservative of timber is naphthalene, which is a solid body and fills the pores of the wood, from which it is not readily removed by any ordinary means. Naphthalene melts at about 175 deg. Fahr. and boils at about 422 deg. Fahr.; but it is said by Allen to evaporate freely with the vapor of boiling water. This is important to remember, for while it is said that wet wood can undergo the creosoting process, being boiled dry in the heated tank of oil, it must not be overlooked that

*** It will not be necessary for any engine or train occupying the main tracks inside of established yard limits to be protected by flagmen, except when in the time of a first-class train. All trains must be governed accordingly.

much of the naphthalene will thus escape and be lost, or at least kept out of the wood. It is for this reason that timber should, if possible, be treated dry, or at least if dried in the heated vacuum tank this process should be conducted at a moderate temperature to avoid the too serious volatilization of the naphthalene with steam from water at 212 deg.

Even at ordinary temperatures this substance is quite sensibly volatile, but, nevertheless, well preserved timber as old as 32 years was found by Boulton to still contain much naphthalene but no tar acids. These latter had all gone, and from 60 to 75 per cent. of the oil still left in the wood distilled at over 600 deg. This certainly points strongly to the higher distillates as the most enduring preservatives, not perhaps because they are more fatal to low forms of life, but simply because they are fatal in the first place; in the second, they are mechanical preservatives or waterproofers, and they are enduring.

There is also in the higher distillates, notably in the anthracenes which follow the naphthalene series in temperature of volatilization, a product known to chemists as acridine. Its particular characteristic is its irritating effect on organic tissue and its action upon life in all forms, such that it has proved valuable as an ingredient in antifouling paints for ships. It only boils at 680 deg. F., but it is slightly soluble in cold water and more so in hot water, but it will, like naphthalene, distil over with water vapor. It is considered to add greatly to the preservative qualities of creosote, and as it is present in thick oils and not in thin oils, or but slightly, it is one cause of the superior efficacy of the thick oils.

Naphthalene is not soluble in cold water, and it is easy to see that a piece of timber filled with a creosote containing both naphthalene and acridine will retain them both, the former keeping the latter out of the influence of water.

In the products of the distillation of bituminous shales there is no naphthalene, neither in blast furnace tar is it present or in the tar from coke ovens. It is to this absence of the higher distillates of coal that adulteration of coal tar creosote with the products of other processes of distillation is so extremely undesirable. Though the Jameson coke oven gives no naphthalene, Watson Smith states that the tar from Simon Carvé's coke ovens is rich in it and anthracene. This is because the working temperature of the Carvé oven is high.

In England, where all ties are imported and much attention has been given to the subject of creosoting, there has been considerable discussion as to the relative merits of thick and thin oils. London gas is made almost entirely from bituminous Newcastle coal and at a high temperature. Out of London, especially in Lancashire and the populous districts near to the sources of cannel coal and Scotland, the creosote is much richer in tar acids and the so-called country oils are thinner and contain less naphthalene, and are thus less suited for the treatment of timber. Unless metallic ties very soon become more used the question of creosoting will become more and more important in America, and American engineers will be inclined, no doubt, to use the higher distillates in order to avoid all possible volatilization during the summer months. The soft coals of the West would seem to be specially suitable as a source of creosote.

The following specifications have been used in England, or recommended, in order to secure a genuine and durable oil. Dr. Tidy recommends complete liquidity at 100 deg. F., with no after solidification on cooling at above 95 deg. At least 25 per cent. of constituents not distilling below 600 deg., 8 per cent. of tar acids. No adulteration with oils other than coal tar distillates. The first 25 per cent. of distillate to be heavier than water. This specification thus insures a heavy oil with considerable naphthalene, and we may suppose the tar acids are specified as affording evidence of genuineness, while the liquidity at 100 deg. insures thorough penetration. This specification seems rather too liquid for a hot climate creosote.

The English Colonies Crown Agent's specification calls for not over 30 per cent. naphthalene, or other solid, at 40 deg. F. for 75 per cent. of distillate below 610 deg. F., of which at least one-half must distil below 450 deg. F.; for a density of 1.035 to 1.055 at 60 deg. F., and for 7½ per cent. of tar acids (extracted by soda of 1.125 gravity). This specification is one clearly which has been drawn up by a believer in light oils, as it guards all through against excess of higher distillates rather than against their deficiency. The 40 deg. specified for solidity temperature is specially to be deprecated. The Belgian Government in a recent specification called for at least two-thirds to distil at over 482 deg. F., and for no distillate below 392 deg., and allows 30 per cent. naphthalene at ordinary temperature. This is a better specification than the last named.

The Midland Railway of England, which at one time abandoned creosoting as useless, having no doubt used thin oils in excess, stipulate expressly for heavy oil of tar, consisting of that distillate coming over between 350 deg. F. and 700 deg. F. Must be free from everything not so obtained from genuine coal tar, and at least 25 per cent. must come over above 600 deg. F. Fluidity to be perfect at 100 deg. and remain so down to 90 deg. again. Specific gravity at 90 deg. to lie between 1.040 and 1.065 as compared with water at 60 deg. The distillate below 600 deg. must yield 6 per cent. of tar acids when treated with soda of 1.21 gravity.

Sir Frederick Abel specifies exactly as above, except that gravity may range from 1.035 to 1.065. The distillate below 600 deg. must contain at least 9 per cent. of tar acids and must lie between 70 and 80 per cent. of the whole. These last specifications recognize the higher distillates very markedly, especially in fixing the lower limit of 350 deg. For hot climates it seems probable that a lower limit as high as 400 deg. might be employed advantageously. Engineers who have immediate charge of the preparation of creosote could never go far wrong if they could first secure a genuine sample of coal tar and take only such distillates as come over between the proper range of temperatures.

If collected fractionally the various proportions finally intermixed could be fixed arbitrarily. The fixing of 350 degrees as a lower minimum is, of course, a recognition of belief in the efficacy of the tar acids, even though we have distinct proofs in old and good specimens that no tar acids are then left. It would seem, in fact, to be a conservative timidity. Carbolic acid coagulates the albumen of the wood juices, but it is strongly evidenced that albumen may be coagulated by carbolic acid, and this may then be washed out, and the albumen will coagulate. If the action is similar in the timber, then it would seem to be a pure waste of material to allow the tar acids to go into the timber at all.

The subject needs still further revision, but all evidence points strongly to the superior qualities of the higher distillates, if not, indeed, to a final coating or immersion of every tie in a bath of melted pitch as a means of preventing escape of volatile solids from the superficial portions of a tie. It is quite an open question whether the so-called green oils which distil between 550 degrees and 750 degrees, and contain the substance acridine, are not all that is necessary to timber creosoting, leaving all lower distillates for other purposes, or for cooler latitudes.

It is well, also, to point out that the naphthalene and other high distillates are produced originally from coal distilled by a high temperature. London gas is so produced; it thereby loses its best illuminating constituents, and leaves a good hard coke behind and heavy tar oils. In the country whence come the light oils, the gas produced at low heat is superior, but the coke is worse and the tar oils light. This is an unfortunate complication, which, perhaps, may some day be remedied by the advance in chemistry. It would appear a good subject for research how to economically convert the lower to the higher distillates.

NOTES BY AN AMERICAN ENGINEER.

The process described as practiced by Mr. Boulton accomplishes the purpose, and was patented here some years ago by Mr. Pelton, and is known here as Pelton's process. For this process a strong creosoting cylinder is not necessary, as no pressure is required. An open box, large enough to contain the lumber and the oil, and provided with a steam coil on its bottom, is all that is required. The great objection to this process is that it requires too much time; otherwise it is all right.

What is stated in regard to the temperature at which the wood becomes brittle has not proved to be the case in practice in this country where the wood in the creosoting cylinder is, previous to the introduction of the oil, heated by means of a steam coil carrying superheated steam in order to expedite the expulsion of the water and sap, and it is considered here that timber is not rendered brittle at any temperature lower than that at which the wood commences to decompose, say 450 degrees F. A process of charring the outside of the timber has in fact been carried on in some localities, and has not been found to diminish the strength of the timber when carefully done.

What is stated about the heavier oils, comparatively free from carbolic acid, being more efficacious than the lighter ones containing more carbolic acid must be taken *cum grano salis*, because carbolic acid is by far the most valuable constituent of "dead oil," and it would therefore be much more profitable for the producers of the oil to remove the carbolic acid before selling it for creosoting purposes than to allow the carbolic acid to remain.

The question which the writer of the article asks, What is creosote? may be easily answered. The name "creosote" was first applied by Reichenbach in 1832 to the characteristic antiseptic principle contained in wood tar, and all applications of it to other substances are misnomers. Wood-tar creosote ranks next to mercuric bichloride as a germicide, and its germicide properties as compared with carbolic acid are as 8 to 5. Large quantities of this material are at present being produced from the yellow pine wood of the South as a constituent of the wood creosote oil now extensively used for creosoting lumber. This oil seems to be unknown to European engineers and chemists, but practical experience has demonstrated its great value for wood preservation. All the merits ascribed to the heavier coal-tar oils belong to wood creosote oil, as well as other merits which coal-tar oils do not possess, while some serious defects in the latter are not possessed by the former. For instance, instead of naphthalene, which is volatile at ordinary temperatures, wood creosote oil contains a large percentage of paraffine, which is not volatile at any temperature to which wood is exposed in any climate and is more effectual in excluding moisture than naphthalene. Besides this, wood creosote oil is a very fluid oil when warm, in spite of its high specific

gravity—1.030 to 1.060—and therefore more easily penetrates the minute cells of the wood than the heavy viscid oil of coal tar. Considered either as a germicide or as a waterproofing material, wood creosote oil has decided advantages over coal-tar oil as a preserver of wood, and experience has fully demonstrated its power to protect wood against the attacks of marine worms.

Wood creosote oil is a bi-product in the production of turpentine, wood alcohol and acetic acid by the destructive distillation of yellow pine wood, and consequently can be produced at an almost nominal cost. This fact taken in connection with the growing scarcity of coal tar in the United States, in consequence of the general replacement of coal gas by water gas, seems to point to wood creosote oil as the coming material for timber preservation. G. W.

Another engineer writes as follows:

To exhaust air and steam after admitting the creosote does not seem practical or judicious, as it would carry off certain parts of the oil.

It is impossible to penetrate timber through and through with oil as long as engineers in this country require a certain amount of heart in the timber.

I hardly think that creosote oil of so high a specific gravity (1.040 to 1.065) is used or can be obtained in this country.

The Brooklyn Bridge Problem.

The Rapid Transit Cable Company of New York has submitted to the Board of Experts of the New York and Brooklyn Bridge plans for increasing the transportation capacity of the bridge. These plans, which were prepared by Mr. A. Bryson, Jr., Engineer of the Cable Company, cover all details of system and terminals.

It is proposed to connect the two bridge tracks at the terminals by loops, from which two additional loops will branch out at each end of the bridge. The trains passing around these loops will be propelled by auxiliary cables. On the bridge proper three cables are provided, which may be operated all at once if required. The principal feature of this system is the grip-car, which would do away with the use of independent grips on each car. This motor consists of a revolving belt of clips with inner surfaces of leather, between which the traveling cable is held and which in turn pass between two long gripping jaws, opened or closed by the movement of a capstan wheel. As the pressure is applied the clips close upon the cable, and, being faced with leather, do not slip upon it, but upon the long gripping jaws, which are faced with easily replaced metal. By increasing the pressure on the jaws the revolving motion of the clip belt is retarded and the work done is converted into tractive force. Compressed air is used to operate the train brakes, and also to propel the motor when clear of the cables. The entire gripping machine is arranged to slide upon the motor frame, so as to engage with either cable at will. To provide against slipping on the sharp curves the wheels are furnished with inside and outside treads, the former being of lesser diameter and traveling on an inside rail. As a precaution against derailment, the motor is fitted with horizontal wheels which bear upon outside guard rails.

TECHNICAL.

Manufacturing and Business.

F. A. Stinard, formerly with the Boyden Air Brake Company, and before that master mechanic of the New York & Greenwood Lake Railroad, is now representing the National Car Heating Company in Chicago.

The Springfield Emery Wheel Manufacturing Company, of Bridgeport, Conn., announces that more than 90 per cent. of its creditors have agreed to grant it an extension of time, and that it will continue its business to nearly the full capacity of the shops, under the managing board appointed by the committee of creditors.

Mr. A. B. Burtis, W. Sargent, Jr., formerly connected with the Sherwin-Williams Co., and B. Patterson, F. B. Stevens and R. C. Hopkins have associated themselves together in partnership under the title of the Burtis, Patterson, Sargent Co., for the manufacture of paints and colors for railroad use. The office of the company is Room 445, The Arcade, Cleveland, O.

The Berlin Iron Bridge Co., of East Berlin, Conn., is now putting up, at Madison, Me., for the Manufacturing Investment Co., of New York, what it is considered will be the finest paper and pulp mill in the world. The buildings will consist of a machine shop 72 x 185 ft. and one story high; a wash room 74 x 182 ft. and two stories high; a digester building 62 x 221 ft. and three stories high, and a wheel house 73 x 78 ft. and two stories high. All the supporting parts of the building are made of iron, as the heavy loads of a pulp mill necessitate a very heavy construction. The side walls are made of brick, supported by iron girders and columns.

A Novel Mode of Transit for the World's Fair.

One of the most interesting novelties that has been proposed for the World's Fair at Chicago is the multiple dispatch railroad, invented by Mr. M. E. Schmidt, Civil Engineer, and Mr. J. L. Silsbee, architect, of Chicago.

This consists of a belt-line moving platform surrounding a certain portion of the Fair grounds, and designed to transport passengers at varying rates of speed between the different points of interest. The platform is made in three sections, one on each side and one in the middle. The two side platforms are carried on brackets which are cast in one piece with the journal boxes. The journals bear upon the axles outside the wheels, and the wheels, which are of the ordinary inside flange type, travel upon the usual superstructure of tee rails and cross ties. Thus it will be seen that the two side platforms and the axle travel together and at the same rate of speed. The middle platform, which is

furnished with seats and awnings, is mounted on flexible metal rails which bear upon the treads of the wheels so that it always has a speed equal to twice that of the axle. The platforms are divided into sections of such a length as will give to each a pair of wheels at one end, the other end being supported by the coupling to the next section. The details are carefully worked out to meet the demands of sharp curves and heavy traffic. The platforms will be propelled by means of electric motors placed on the axles at intervals throughout the train and giving the outside platforms a speed of three miles per hour.

In the application for patents the features of novelty claimed are in a railway for increasing the speed of the car over that of the axle, the combination of a fixed track, wheels rotatable on the fixed track, flexible traveling rails supported on the peripheries of the wheels, and advanced as they rotate, a car supported on the traveling rails, a series of two or more traveling platforms, each having its framework supported by a single pair of wheels at or near one end and supported at the other by the next adjacent platform. A railroad rail, composed of flat metallic bars adjustably connected together to secure flexibility and strength.

A working model is on exhibition in the Rookery building at Chicago.

The Nicaragua Canal.

Mr. F. P. Davis, Division Engineer in charge of the work, has sent in a report, dated Oct. 8, 1890, to the Nicaragua Canal Construction Co., in which he says that all practicable routes have been surveyed and the final location nearly completed for all dams, embankments and locks. Borings have been taken to the bottom of the canal and to the bottoms of all foundations, many of them being from 200 to 300 ft. deep. Surveys have been made for a railroad from America to Ochoa across what has been considered an impassable swamp between the San Juan lagoon and the Bernard lagoon. Ten miles of railroad were built, of which six were laid through swamp. Great difficulty was experienced in the construction of a telegraph line, the first 10 miles of which passed through a deep swamp. The work of clearing for the canal was begun last January, the chopping being done at a disadvantage in the wet weather, so that the wood might be burned in April. About 11 miles were chopped to the full width of 486 ft.

The breakwater at Greytown Harbor was built by driving piles into the harbor for a distance of 1,000 ft. and building stonework with rock and gravel filling around them. The breakwater will be extended 1,000 ft. farther, but the addition will be entirely of stone. The wall will have a sea depth of 30 ft. and the harbor will be dredged to the same depth uniformly.

Chief Surgeon J. Edward S. uffer reports favorably on the health of the employees. He states that only two-thirds of one per cent. of those admitted to the hospital with diseases contracted in the country have died. These diseases are not, as generally supposed, entirely malarial, since only 51 per cent. of the cases treated in the past three months have been due to fever in any form.

A cable dispatch to President Miller announces that actual canal excavations have begun on the canal and that there are 12 ft. of water on the bar at Greytown. It is expected to increase this depth to 20 ft. in the next four weeks. This will enable all vessels to discharge at the company's docks.

New Shops of the Springfield Emery Wheel Co.

The Springfield Emery Wheel Co. has recently moved into its new shops at Bridgeport, Conn. The buildings are fitted with all modern devices for safety, comfort and economy. The main building, which is two stories in height, contains the offices and draughting rooms of the company and is provided with fireproof vaults. The machine shop, tool room, and sandpaper department are also in this building. The pattern shop, core ovens, engines, boilers and emery wheel department occupy a building in the rear. Ample side tracks enter the grounds from the New York, New Haven & Hartford Railroad, and the docks on the water front are practicable for all vessels from the Sound. The buildings are heated by the Sturtevant Hot Air Blast and light is provided by an isolated plant of the Westinghouse incandescent system.

The New York and Long Island Tunnel.

The resolution permitting the New York & Long Island Railroad Co. to build a tunnel under Forty-second street from river to river was passed again by the New York Aldermen, Dec. 23, after the revision suggested by the Mayor. The payment to the city of a percentage of the gross receipts, "inclusive" of city taxes, becomes "exclusive" of city taxes. The resolution was passed by 15 to 10 as against 14 to 11 when it was passed before.

THE SCRAP HEAP.

Notes.

The freight handlers of the Flint & Pere Marquette at Ludington, Mich., struck Dec. 17, in consequence of a reduction of pay from 20 to 15 cents an hour.

John Reed, one of the men who confessed to wrecking a train near Castleton last September, is now on trial at Troy, N. Y. Pinkerton and many of his men are on hand.

A general strike of train and signal men took place on the railroads of Scotland on Monday of this week, all the freight and most of the passenger trains being suspended on the lines of the Caledonian, North British and Southwest companies.

The pay car of the Louisville, New Orleans & Texas was derailed near Woodville, Miss., Dec. 20 by would-be robbers, three men being injured in the wreck. The company had heard of the plot, and a detective on the train captured the wreckers.

The snowstorm of last week extended over an unusual area and caused delay and damage on roads which are rarely troubled in that way. On the 17th the Chesapeake & Ohio was completely blocked on the Huntingdon division. The same evening a passenger train drawn by three engines was derailed by a snow drift on the Valley branch of the Baltimore & Ohio near Harrisonburg, Va., six trainmen being injured. The Pittsburgh division of the Baltimore & Ohio was badly blocked and one train load of passengers suffered some from lack of food. They complained loudly of harsh treatment by the men in charge of the Pullman car, in which were some provisions.

Fires.

The paint shop and the car repair shop of the Illinois Central in Chicago were entirely destroyed by fire on the night of Dec. 21, together with 20 passenger coaches worth \$3,500 apiece. The fire was stopped just before reaching a building containing a large lot of valuable patterns. The total loss is estimated at \$125,000.

The new hotel and offices of the same road at Mounds,

Junction, Ill., recently completed, were destroyed by fire last week. The section house was also destroyed. Loss, about \$10,000. The fire is said to have originated in the kitchen of the hotel.

The shops of the same road at Water Valley, Miss., were burned Dec. 16. The fire broke out in the engine room, which prevented the use of the engine for pumping water. Loss, \$50,000.

On the 17th 14 cars on the Louisville, New Orleans & Texas, loaded with 700 bales of cotton, were destroyed by fire at Burns Station.

The car department of the Central Branch Union Pacific shops, at Atchison, were burned at 1 o'clock a. m., Dec. 20. Two new passenger coaches and a mail car, and all the machinery were consumed.

The United States Rolling Stock Co.

A. Hegewisch, as receiver of the United States Rolling Stock Co., has been authorized by the United States Court at Chicago to issue receiver's certificates to prevent the sale of capital stock of the company put up as collateral security. The unfunded and unsecured indebtedness of the company consists of \$470,667 in bills payable and \$347,918 in open accounts, all incurred for materials, supplies and services rendered prior to the receiver's appointment. Collateral loans made by the company from various banks aggregate \$351,608, and securities given consist principally of car trust or equipment bonds amounting to \$490,214. A loan of \$48,665, due Dec. 1, is secured by a deposit of about \$450,000 of the capital stock of the company as collateral. The receiver says that the excess of the assets of the company over its liabilities is over \$2,000,000.

Explicit.

The literary editor of the New York Central & Hudson River has caused this legend to be posted at the Cold Spring station:

Tickets to points more than three miles from this station will be sold at less than lawful rates.

The Bolivar Accident.

On the afternoon of Dec. 18 an eastbound passenger train of the Wheeling & Lake Erie, consisting of engine and three cars, was partially wrecked while running about 15 miles an hour near Bolivar, O., and six passengers were killed. The hind truck of the rear car jumped the track just before reaching a trestle, and becoming uncoupled from the rest of the train was overturned soon after running upon the trestle and fell, bottom upward, about 35 ft. to the ravine below. The approach to the trestle is by an eight degree curve, but there is a tangent of 200 ft. before reaching the trestle and the derailment occurred about 168 ft. after entering the tangent. From this point the derailed wheels ran on the sleepers and struck the bridge inside the guard timbers, which are of oak 6 x 8 in.; but the sleepers were somewhat bunched, and the wheels rode over the guard timber and the car ran off the ends of the sleepers. The cause of the derailment has not yet been discovered. The coroner who investigated the case is satisfied that the speed was quite low, and a civil engineer who has visited the scene of the wreck makes no serious criticism on the condition of the track. A correspondent of the *Railroad Gazette* who looked the ground over says that the rails were in true gauge after the accident, and it appears that trains were immediately run over the bridge without the making of any repairs to the track whatever. The officers of the road say that no sharp flanges or other defects can be found in the trucks. The Wheeling & Lake Erie has never before, during its existence of nine years, killed a passenger, and the section master in charge of this section of six miles says that there has never been a derailment upon it.

LOCOMOTIVE BUILDING.

The Dickson Mfg. Co., of Scranton, Pa., has received an order for 17 locomotives from the Delaware, Lackawanna & Western.

CAR BUILDING.

The Delaware, Lackawanna & Western has let a contract for 1,000 coal cars to the Jackson & Woodin Mfg. Co., of Berwick, Pa. Another 1,000 cars has been let to one of the firms on the line of the road.

BRIDGE BUILDING.

Akron, O.—It has been decided to submit the question of a \$30,000 bridge, over the Cuyahoga River, below the Big Falls, to a vote of the people, at the Spring election.

Eau Claire, Wis.—The Wisconsin Central's new bridge across the Eau Claire River at Eau Claire, built to give access to the new station grounds in the business centre of the east side, has been completed.

Hamilton, O.—The Commissioners have decided to erect a one span iron or steel bridge, 90 ft. long, over Four-mile Creek, at a cost of \$12,000.

Hawkinsville, Ga.—Proposals are wanted by D. G. Fleming, Clerk of the County Commissioners, until Jan. 27, for the erection of a bridge over the Ocmulgee River, at Hawkinsville.

Johnsonburg, Pa.—The Buffalo, Rochester & Pittsburgh is about to replace two wooden bridges at Johnsonburg with steel ones.

Kansas City.—The only bid for constructing a bridge over Turkey Creek, received by the Board of Public Works, was that of the Kansas City Bridge & Iron Co., \$4,412.

Mount Morris, N. Y.—The Chief Engineer of the Western New York & Pennsylvania is preparing plans for a single track iron bridge, to cost about \$18,000, to replace the wooden one across the Genesee River at this place. It is to have three spans of 140 ft. each and will rest on the present piers.

New York City.—The Pennsylvania has begun the work of constructing an iron viaduct over West street, at the foot of Cortlandt street, New York, for the accommodation of passengers to and from the ferry to its Jersey City station.

Proposals are wanted until Jan. 7 for the superstructure of a foot bridge over the New York Central & Hudson River and New York & Northern roads, near the Washington Bridge, by the Harlem River Bridge Commission.

Rayville, La.—The Secretary of War has finally approved the plans of the New Orleans & Northwestern for a drawbridge across the Boeuf River, about three miles north of Rayville, and the engineers of the department have approved the location of the site.

St. Paul, Minn.—The City Clerk has been authorized to advertise for bids for the approaches of the Hamlin avenue bridge.

Verrugus Viaduct.—The cantilever bridge connecting the completed portions of the Lima & Oroya road in Peru was opened on Wednesday. This bridge is 575 ft. in length and 252 ft. above the surface of the valley which it spans. It replaces the bridge which was destroyed in March, 1889. The bridge was designed and its construction supervised by L. L. Buck, of No. 18 Broadway, New York. The New Jersey Steel & Iron Co. had the contract for the iron work. The structure was described in these columns April 25.

Zanesville, O.—The Smith Bridge Co., of Toledo, O., has been awarded the contract for the superstructure of the Fifth street bridge for \$89,000; the contract for the substructure has been let to T. B. Townsend, at \$6.75 per cubic yard, for masonry and \$25 per M. for timber.

RAILROAD LAW—NOTES OF DECISIONS.

Carriers of Goods and Injuries to Property.

In the Federal Court it is held that equity has no power, either at common law or under the interstate commerce act, to compel a railroad company engaged in interstate commerce to enter into a contract with another company for a joint through rate and joint through routing of freight and passengers.

In Pennsylvania the Supreme Court rules that a stipulation in a bill of lading which provides that an agreed valuation shall cover loss or damage from any cause whatever does not relieve the carrier from liability for the actual value of the goods when their loss is caused by its negligence.

In New York the Supreme Court holds that the refusal of a common carrier to deliver to the consignee goods which reached their destination in good order proves a conversion; and it is no defense to an action therefor against the carrier that by mistake it delivered the goods to a third person, and that it offered to deliver the consignee other goods of equal value.

In Texas, by a contract between the plaintiff and a railroad whose line connected with that of the defendant, it was agreed that plaintiff's cattle should be transported to a point beyond the line of such road, the liability of the contracting road to cease at its terminus. From that point the cattle were hauled over several roads, and were finally delivered to the defendant road, which delivered them at their destination, and collected all charges for carriage from plaintiff. The Texas law provides that every railroad company shall, for a reasonable compensation, draw over its road without delay the passengers, merchandise, and cars of every other railroad company which may enter and connect with its road. The Supreme Court holds that the facts were insufficient to fix any liability upon defendant, as member of a partnership, or as joint contractor, for injuries received by the cattle on roads other than its own; its action in hauling such cattle, as it was required to do by law, not of itself amounting to a ratification of the contract.

In Minnesota the Supreme Court rules that cattle roaming on a highway are "at large" even though upon their owner's premises.

In New York the Court of Appeals rules that in view of the fact that the decision in the Story case, that an abutting owner is entitled to damages caused by an elevated railroad in the street, is not broad enough to necessarily cover the case of an abutting owner whose only property in the street is an easement of light, air and access, the failure of an elevated railroad company to institute condemnation proceedings along its whole line within two years after that decision is not of itself such a wanton and oppressive act as to entitle an abutting owner to punitive damages.

In Indiana the Supreme Court holds that, in the absence of express statutory authority therefor, a city has no right to condemn, for the purpose of a public street, land held and used by a railroad company for its depot and track.

Injuries to Passengers, Employees and Strangers.

In New York the plaintiff purchased a ticket entitling him to transportation from B. to H., on defendant's railroad, without any limitation as to time or train. He stopped over at A. and resumed his journey by the next train. The conductor of the second train told him his ticket was punched to H. and he must pay the fare from A. to H., or be put off the train at M., the next station. Plaintiff remonstrated, but on arriving at M. purchased a ticket from that place to H., which the conductor refused unless plaintiff paid the fare from A. to M., and on plaintiff refusing to do this he was put off the train. The Supreme Court holds the railroad liable.

In North Carolina the Supreme Court rules that a railroad is not liable for injuries sustained by a passenger who goes on the platform of the car, contrary to a posted notice warning him not to do so, and while standing there without holding to the railing is thrown off by the starting of the train.

In Minnesota the Supreme Court holds that the fact that a railroad company has a rule prohibiting passengers being in its baggage cars does not absolve it from the duty of care toward passengers who are in a baggage car, if it habitually disregards the rule and permits passengers to ride in such cars.

In New York a passenger was injured by the breaking of the spindle of the draw-head of a car. In an action to recover for the injuries, the evidence on the part of company showed that to examine the spindle it was necessary to pull the cars apart and take out the draw-head; that a spindle of a draw-head had not been known before to break by the use of it made in running trains; and that, while a car was ordinarily used for 25 years, the spindle in question had been in the car only two years. There was evidence that there was a flaw in the spindle, at the point where severed, $\frac{3}{4}$ in. deep, and that no inspection had ever been made of the spindle while it was in use. The Court of Appeals holds the railroad liable.

In Texas the Supreme Court rules that in an action for an injury brought by a brakeman who was 16 years old at the time of the accident, was of average intelligence, and was employed without the consent of his parents, defendant must show that plaintiff possessed the capacity and experience to do the work in safety, though there is no evidence of negligence on the part of plaintiff or of his fellow servants.

In New York the R. Company, having the right to run its trains over defendant's track between O. and F., subject to the rules of defendant, sent out a special train, which was held at F. for orders. An order was sent by defendant to run the special train to O., but no notice of such order was sent to the manager of the shifting

engine in defendant's yard at O.; the engineer of which, on seeing the train approaching, abandoned his engine. A collision occurred, and the shifting engine went forward with increased speed and into an engine of the R. Company, on which plaintiff's intestate was fireman. The Supreme Court holds that the fact that deceased and the engineer of the special train were fellow-servants did not affect the question of defendant's liability; the rule of non-liability for the negligence of a fellow-servant applying only when the action is brought against the common master.¹²

In the Federal Court it is ruled that the foreman of repair shops entrusted with restoring wrecked trains, with the assistance of a crew of men selected from the workmen in the shops and the section hands, and who has charge of all the men engaged in restoring the train, is, when in charge of a wreck, a vice-principal, for whose negligence the railroad company is liable to a workman injured while under his orders.¹³

In New York, at the crossing of a street by three railroad tracks, a train standing on the middle track obstructed the view of the third track. Plaintiff's intestate was killed at such crossing, just after he had passed the middle track, by an engine backing down the third track. The Supreme Court rules that deceased, having waited for the gates to open, and seeing a team enter the opposite side of the crossing, had a right to take it for granted that the crossing was safe; and his failure, after passing the standing train, to stop and look both ways is not conclusive evidence of contributory negligence.¹⁵

In North Carolina, in crossing a railroad track on horseback, on a private way, plaintiff's horse caught its shoe between the rail and a spike, and was thrown down, and its foot, still remaining caught, was injured by a dump-car which came along soon after, and which plaintiff had signaled in time to stop before running over the horse. The safety of the place as a crossing was in dispute. The Supreme Court holds that the plaintiff may have been negligent, but the fact that he was a trespasser in attempting to cross a railroad track at a place other than a public crossing will not excuse the company from an injury which, by ordinary care, it could have avoided.¹⁶

In Oregon the Supreme Court rules that where there is no direct evidence that a traveler did not stop, look and listen at a railroad crossing, it will be presumed that he observed these precautions.¹⁷

In North Carolina the Supreme Court holds that no recovery can be had by a person walking on a track being run over by an engine moving at five miles an hour, and which he could have noticed by using his senses.¹⁸

¹ Little Rock R. Co. v. St. Louis, I. M. & S. Co., 41 Fed. Rep., 559.

² Penn. R. Co. v. Wedler, 19 Atl. Rep., 702.

³ Clement v. N. Y. C. & H. R., 9 N. Y. (Supp.), 601.

⁴ Ft. Worth & D. C. R. Co. v. Williams, 13 S. W. Rep., 637.

⁵ Johnson v. M. & St. L. R. Co., 45 N. W. Rep., 152.

⁶ Powers v. Manhattan Ry. Co., 24 N. E. Rep., 295.

⁷ City of Valparaiso v. C. & G. T. Ry. Co., 24 N. E. Rep., 249.

⁸ Ward v. N. Y. Cent. R. Co., 9 N. Y. Supp., 377.

⁹ Malcolm v. R. & D. R. Co., 11 S. E. Rep., 187.

¹⁰ Jones v. C. St. P. & O. Ry. Co., 45 N. W. Rep., 444.

¹¹ Palmer v. D. & H. C. Co., 24 N. E. Rep., 302.

¹² Gulf, C. & S. F. Ry. Co. v. Jones, 13 S. W. Rep., 374.

¹³ Nary v. N. Y. C. & W. Ry. Co., 9 N. Y. Supp., 153.

¹⁴ Borgman v. Omaha & St. L. R. Co., 41 Fed. Rep., 667.

¹⁵ Oldenburg v. N. Y. C. & H. R., 9 N. Y. Supp., 419.

¹⁶ Lay v. R. & D. R. Co., 11 S. E. Rep., 412.

¹⁷ McBride v. North Pac. R. Co., 23 Pac. Rep., 814.

¹⁸ McAdoo v. R. & D. R. Co., 11 S. E. Rep., 316.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern, semi-annual, 1½ per cent., payable Feb. 2.

Central of Georgia, semi-annual, 4 per cent., payable Dec. 23.

Chicago, Rock Island & Pacific, quarterly, \$1 per share, payable Feb. 2.

Chicago, St. Paul, Minneapolis & Omaha, 2 per cent. on the preferred stock, payable Jan. 20.

Kansas Southern, semi-annual, 2 per cent., and extra, 1 per cent.

Lake Shore & Michigan Southern, semi-annual, 2½ per cent., and extra, 1½ per cent., payable Feb. 2.

Michigan Central, semi-annual, 2 per cent., and extra, 1 per cent., payable Feb. 2.

New York Central & Hudson River, quarterly, 1 per cent., and special, ½ per cent., payable Jan. 15.

New York, New Haven & Hartford, quarterly, 2½ per cent.

Pennsylvania & Northwestern, semi-annual, 2½ per cent., payable Jan. 10.

Toledo & Ohio Central, quarterly, 1½ per cent. on the preferred stock, payable Jan. 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, annual, Addison, N. Y., Jan. 12.

Albany & Poughkeepsie, annual, Norfolk, Va., Jan. 20.

Boston & Lowell, annual, Boston, Mass., Jan. 7.

Buffalo, Thousand Islands & Portland, annual, 96 Broadway, New York City, Dec. 29.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 7.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 13.

Kings County (Elevated), annual, Brooklyn, N. Y., Jan. 14.

Lehigh Valley, annual, Philadelphia, Pa., Jan. 20.

Little Schuylkill, annual, 410 Walnut street, Philadelphia, Pa., Jan. 14.

Mine Hill & Schuylkill Haven, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 12.

Nesquehoning Valley, annual, 226 South Third street, Philadelphia, Pa., Jan. 12.

New York, Ontario & Western, annual, 18 Exchange place, New York City, Jan. 21.

North Pennsylvania, annual, Philadelphia, Pa., Jan. 14.

Norwich & Worcester, annual, Worcester, Mass., Jan. 14.

Ottawa Colonization, annual, Montreal, P. Que., Jan. 6.

Philadelphia & Reading, annual, Philadelphia, Pa., Jan. 12.

Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 12.

Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 27.

Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 27.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 29.

Pontiac Pacific Junction, annual, Montreal, P. Que., Jan. 14.

St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 13.

Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan. 5.

Terre Haute & Logansport, annual, Terre Haute, Ind., Jan. 5.

Toledo & Ohio Central Extension, annual, Marietta, O., Jan. 12.

Western & Atlantic, annual, Atlanta, Ga., Jan. 21.

Western New York & Pennsylvania, annual, 242 South Third street, Philadelphia, Pa., Jan. 12.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Southern & Southwestern Railway Club will hold its next meeting in Atlanta, Ga., Jan. 15.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday, of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m. in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the Southwest generally holds its meetings at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

American Society of Civil Engineers.

The thirty-eighth annual meeting of the society will be held in New York, on Wednesday, Jan. 21, 1891, at 10 o'clock. The annual reports will be presented, officers for the ensuing year elected, time and place for the annual convention considered, reports of standing committees, and of committee on revision of the constitution will be presented.

Lunch will be served at the Society House. Arrangements for the days and evenings of Wednesday and Thursday, Jan. 21 and 22, will be perfected by a committee.

Engineering Association of the Southwest.

The regular December meeting of the Engineering Association of the Southwest was held at Birmingham, Ala., Dec. 12. President John B. Atkinson in the chair, and 31 members present. The report of the tellers showed the election of Ernst Prochaska, Metallurgical Engineer, Bessemer, Ala., as a member, and that the proposed amendment to the constitution regarding the change of the name of the association was carried by a vote of 37 to 7. The association will therefore be called the "Engineering Association of the South."

Mr. W. C. Smith, chairman of the committee appointed at the July meeting to prepare a bill and a petition to the State Legislature of Tennessee looking to the repeal of the State tax on engineers and architects in Tennessee requested an extension of time in which to secure additional statistics from other states, and was accordingly continued.

Applications for membership were received from Geo. H. Crafts, Civil Engineer, Atlanta, Ga.; R. L. Johnson, Instructor in Engineering, Vanderbilt University; R. A. Chapman, Chief Engineer Riverton Land Co., Sheffield, Ala.; Thos. B. Wilson, Jr., Assistant Engineer, East Tennessee Land Co., Harriman, Tenn., and Henry A.

Turner, Division Engineer, Alabama Mineral Railroad, Birmingham, Ala.

Mr. A. V. Gude, of Atlanta, Ga., presented a paper on the Georgia Pacific Railroad Bridge over the Yazoo River, Miss. The point of special interest connected with the erection of the structure was the manner of constructing the pivot pier for the draw span. A sub-foundation was prepared by driving a large cluster of cypress piles and sawing them off at a uniform elevation level with the bed of the river, by means of a submerged circular saw, thus preparing the top to receive the grillage. The grillage, which was octagonal in shape, was formed by three courses of timbers drifted together somewhat larger than the outside dimensions of the pier which it was intended to receive.

The grillage was floated into position over the sub-foundation, and confined by guide piles on each of the eight sides and the ring of masonry forming the face of the pier was commenced thereon, leaving the interior hollow. As the grillage with its load sank, the ring of masonry was raised higher and the water which came through the ring was kept down by pumping to the extent which should permit the buoyancy of the water to support the pier. The pier was prevented from unequal settling by four vertical rods attached at their lower ends to the grillage and at their upper ends to cross timbers framed to the guide piles. As fast as the pier sank under the increased load of masonry the nuts on the upper ends of these rods were slackened and permitted them to be drawn down by the weight of the masonry. They were not intended to support any portion of the weight of the pier but were simply intended to insure the vertical descent of the pier. After the grillage reached the pile-foundation prepared for it, the interior of the pier was built up solid with masonry.

In the discussion which followed Col. Jno. MacLeod, of Louisville, Ky., described a method somewhat similar employed by him in securing the foundation of one of the bridges on the Chesapeake & Ohio Railroad, in which case the pier was lowered by 12 vertical suspending rods 2½ in. in diameter which supported the entire weight of the masonry ring without any material assistance from the buoyancy of the water. In discussing the superstructure of the bridge Mr. Gude advocated abolishing 6-in. connected trusses up to 150 ft. span, recommending the use of plate girders up to 75 ft. and riveted lattice girders from 75 to 150 ft. spans.

A paper entitled "The Professional Status of Engineers, and the Ethical Relations which should Control their Business Relations with Each Other and with the Public," was then presented by Mr. William G. Williamson, Montgomery, Ala. The paper was mainly directed to pointing out what the author considered abuses in the engineering profession, particularly such as discouraging young engineers by requiring them to compete with untrained men; the practice of engineers knowingly underbidding one another for professional engagements, and the practice on the part of engineers of undertaking professional work by contract for a stipulated sum. The writer urged the importance of union of effort on the part of engineering societies looking to the adoption of measures by which the faults pointed out might be rectified.

In the discussion which followed Mr. Locke thought that the law of the "Survival of the fittest" the only efficient remedy. Messrs. Dudley and Smith believed that the adoption of a schedule of minimum charges would be valuable in educating the profession and the public appreciation in the legitimate value of engineering services. Mr. Carter thought the violations of professional courtesy and justice could best be remedied through an extension of personal acquaintanceship among the members of the profession, and thought that the engineering organizations would thoroughly accomplish this.

Capt. Cobb pointed out that no schedule if adopted could apply to engineers occupying salaried positions, who constituted a large number of the members of the profession, and Mr. Landreth thought the wide variation in the ratio of both the amount and the character of engineering services to the cost of the work on which it was expended would render difficult of adoption any schedule based on the percentage plan, such as is employed by architects, and further thought that the continued discussion on the violation of ordinary courtesy and justice if maintained by the leading members of a profession and the engineering press would ultimately result in an unwritten code of ethics which would be more efficient than any written code could be, on account of the widely differing conditions controlling the transactions of business in the several branches of the profession. It was generally conceded that a wide discussion by the several engineering organizations should be encouraged and secured before taking any formal action. Col. MacLeod's suggestion that the matter be kept before the engineering societies and the engineering press, and be finally brought before the Engineering Congress in 1893, was accepted as the best manner of procedure.

Mr. Carter, of Birmingham, announced for the local committee the programme for the excursion through the mineral district of Birmingham, to be made on Saturday. The Association then adjourned to meet Jan. 8, at Nashville, Tenn.

Engineers' Club of Philadelphia.

A business meeting was held Dec. 6, President H. W. Spangler in the chair; 35 members and three visitors present.

A resolution was passed providing that a committee of three members be appointed by the President to consider the best means of increasing the interest in the club and its meetings; that the committee investigate the cost of printing papers to be read before the Club, and distributing them before the meeting; and that they report at the next meeting upon such other changes in the organization of the club as they consider desirable.

Mr. John E. Codman presented notes on the rainfall in the vicinity of Philadelphia in 1889. He gave a detailed and interesting description of the automatic rain gauge which has been used by the Philadelphia water department in order to measure the extraordinary rainfall with accuracy.

Mr. Strickland L. Kneass read a paper on the "Internal Condition of an Elastic Fluid During Discharge Through an Orifice." The theoretical conditions of discharge required to produce a maximum terminal velocity were first considered, and after showing the application of the law of adiabatic expansion, the action of the discharging jet was clearly shown by diagrams plotted from actual experiments. These indicated the relation of the expansion and velocity to the forms of nozzles used, and showed the changes in shape requisite to produce the highest efficiency at different steam pressures.

The experiments were described in detail and consisted of observations taken from a brass tube 0.3 in. diameter, pierced by seven small holes. Upon these were

placed pressure gauges and the tension of the steam was obtained at seven different points of the tube; from this data was determined the velocity of the steam at every point of expansion between initial and terminal pressures. The phenomena of discharge under some conditions were peculiar, one experiment showed an actual tension of the steam from 5 to 7 lbs. below atmospheric pressure, even though the tube was discharging freely into the air. The paper closed with the description of a nozzle proportioned upon the theory of constant acceleration. The results obtained with this tube fully confirmed the truth of the theory, as the terminal velocity of discharge approached very close to the theoretical value, and indicated a higher efficiency than any other form of nozzle.

There was some discussion by Prof. H. W. Spangler, Messrs. Wilfred Lewis, J. C. Trautwine, Jr., H. M. Chance and Howard Murphy.

Mr. Wilfred Lewis presented a description of a new feed ratchet invented by him, which he illustrated by a specimen of the same.

Montana Society of Civil Engineers.

The regular monthly meeting of the society was held Dec. 20, at 8 p. m., at the office of Messrs. Sizer & Keel, Room 13, Atlas Building, Helena, Mont. A memorial of the life of the late President of the society, Benjamin H. Greene, was submitted by the special committee.

Mr. Finlay McRae exhibited the "Arithmometer" now used at the U. S. Surveyor General's office, and demonstrated advantages resulting from its use upon certain classes of calculations.

New York Railroad Club.

A regular meeting of the New York Railroad Club was held at the rooms of the Club, Gilsey House, New York City, Thursday, Dec. 18, at 2 o'clock p. m. First Vice-President R. C. Blackall was in the chair and about 30 members were present. The minutes of the preceding meeting were read and approved. The following were elected members: W. G. Berg, Principal Assistant Engineer, Lehigh Valley Railroad; Samuel Porcher, Assistant Engineer Motive Power Department, Pennsylvania Railroad; V. B. Lang, Foreman West Shore Shops, New Durham; C. H. Koyl, National Switch and Signal Co.; W. F. Pascoe, Superintendent Bridges, Lehigh Valley Railroad; C. D. Halsey, Assistant Engineer, Pennsylvania Railroad; H. Comer, Assistant Superintendent Lehigh Valley Creosoting Works; James Howard, Beals Railway Brake Co.; Thomas Millen, Master Mechanic New York & Northern Railroad; G. W. West, Superintendent Motive Power, New York, Ontario & Western Railroad; J. C. Gibbs, Central Railroad of New Jersey.

A paper was read by Mr. R. A. Parke, Westinghouse Air Brake Company, on Brake Rigging: the Character of the Apparatus, its Care in Maintenance and its Operation. This is published on another page. The discussion of the paper was very brief.

The question of printing this paper in a pamphlet for the use of the club was discussed and left to the discretion of the Finance Committee.

The Secretary announced as in preparation for succeeding meetings papers on Combustion, and Smokestacks of Uniform Size for all Classes of Engines; on Anthracite and Bituminous Coal-Burning Engines in Passenger Service, and on the English Compound Locomotive on the Pennsylvania Railroad.

The meeting then adjourned to the third Tuesday in January.

Rensselaer Polytechnic Institute.

A lecture on foundations was delivered by Francis Collingwood, M. Am. Soc. C. E., of the class of 1855, of the Rensselaer Polytechnic Institute, before the students of that institution on Dec. 16.

Swedish Engineers' Club of New York.

A meeting of the club will be held at its rooms, No. 250 Union street, Brooklyn, on Saturday, Dec. 27, when an address will be made by Mr. F. Arsenius, of the United States Navy Yard, at Brooklyn. The subject of the paper is "Shipping and Shipbuilding on the Lakes." A regular monthly meeting will be held at the club rooms on Saturday, Jan. 3.

PERSONAL.

—Mr. John Carland, Superintendent of Construction of the Toledo, Ann Arbor & North Michigan, has tendered his resignation. He has been connected with the road for the past six years.

—Mr. J. N. McCullough, First Vice-President of the Pennsylvania, is seriously ill at his home in Allegheny. He has never fully recovered from the shock he received in a wreck at Mingo Junction several years ago, and recently his strength again failed him.

—Mr. W. H. Bennett has been appointed General Passenger and Ticket Agent of the Toledo, Ann Arbor & North Michigan in addition to his present duties as General Freight Agent. He succeeds Mr. A. J. Paisley, who had held the position for some time.

—Mr. C. C. Wheeler, formerly Assistant General Manager of the Chicago & Northwestern, and at present consulting engineer at Chicago, has been elected President of the Chicago, Fort Madison & Des Moines road, an Iowa line which proposes to build some long extensions.

—Mr. F. P. Boatman, Master of Rolling Stock of the Ohio & Mississippi road for the last two years, has been appointed Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, succeeding in that position Mr. W. F. Turrell, now Master Mechanic of the Chicago & Erie.

—Mr. Samuel Irwin, Master Car Builder of the Missouri Pacific, has resigned, and will leave the service of the company Jan. 1. He has been Master Car Builder of the Missouri Pacific for the past eleven years, and was previously connected with the Pullman Palace Car Co. for a similar period of time.

—Mr. Charles Paine, Vice-President and General Manager of the Philadelphia Company, Pittsburgh, Pa., has resigned, to take effect Dec. 31. He will at once remove to New York City, where he has already opened an office as senior member of the firm of Charles Paine & Sons, Consulting and Civil Engineers. The firm will give especial attention to railroad work of all kinds.

—Mr. Chas. H. Jones, Jr., who was obliged to resign his position as the Vice-President and General Manager of the Suffolk & Carolina, as Manager of the Suffolk Steamboat Co., and to give up all his business interests in November last because of nervous prostration, has about recovered and is spending a few weeks at his country place near Baltimore prior to his engaging in active service once more.

—Mr. Allen Fort, at present a judge of the Superior Court of Georgia, has been appointed State Railroad Commissioner for a term of six years, to succeed Mr. Alexander Irwin, whose term expires Oct. 15, 1891. Judge Fort is a resident of Americus and is about 40 years old. He has been a member of two state legislatures and during one of the terms introduced the bill to establish the railroad commission.

—Mr. Frank V. Davis, recently appointed Freight Traffic Manager of the Chicago & Eastern Illinois, has resigned that position to accept one as General Freight Agent of the Chicago & West Michigan and Detroit, Lansing & Northern roads. Mr. Davis has been connected with the Chicago & Eastern Illinois since 1874, as Chief Clerk in the general freight office for eight years, Assistant General Freight Agent for three years, and General Freight Agent since April, 1885.

—Mr. Joseph F. Tucker, who has been Assistant General Manager of the Chicago, Milwaukee, & St. Paul for the last five years, has resigned that position. Mr. Tucker is now about 55 years old, and has been in railroad service since 1856. From that time till 1884 he was connected with the Illinois Central, serving as Ticket Agent, Secretary to the President, General Freight Agent for ten years, General Superintendent two years, Master of Transportation and Traffic Manager.

—Mr. P. T. Downs, who has been Superintendent of the main stem division of the Louisville & Nashville for the past four years, has voluntarily resigned that position and has been succeeded by Mr. William T. Pike, Master Mechanic at Louisville. The cause of Mr. Downs' resignation was a difference of opinion with other officers of the road. He has been connected with the company for about 15 years, and has served as conductor, yard master, train master and Superintendent of the Knoxville Division. He was born in Ireland 43 years ago, and has been in railroad service in this country since July, 1868, his first position being passenger brakeman on the Vermont Central.

—Mr. William T. Pike, master mechanic at Louisville, who succeeds Mr. Downs as superintendent of the main stem division of the Louisville & Nashville, has been in the service of the company in the mechanical department for a number of years and was master mechanic at East Nashville before his transfer to Louisville. He is succeeded as master mechanic by Mr. J. G. Clifford, who at present holds a similar position on the Mobile & Montgomery and Mobile & New Orleans divisions. Mr. Clifford has been master mechanic at Mobile since 1886 and was previously master mechanic of the Louisville & Nashville at Bowling Green and also of the Paris & Decatur road.

—Mr. William B. Knight, of Kansas City, whose recent death at Jacksonville, Ill., was caused by injuries sustained in an accident on the Chicago & Alton, was one of the best known civil engineers in the West. He was interested in a great many local enterprises at Kansas City, and at the time of his death was Chief Engineer of the Kansas City Belt Line, Kansas City & Suburban Belt, Union Depot Co., and many street railroads and other enterprises in the West and South. He has been Chief Engineer of many railroad and other companies, and was also City Engineer of Kansas City for some time. Mr. Knight was President of the Engineers' Club of that city in 1887 and 1888. He was associated with Mr. Daniel Bontecou for some years in the firm of Knight & Bontecou.

—Mr. George H. Vaillant, Freight Traffic Manager of the New York, Lake Erie & Western, has been elected Second Vice-President of the company, in charge of the traffic department. Mr. Vaillant is 50 years old and was born in France. He has been connected with American railroads since 1855, mostly in the freight departments. His first position was as clerk in the local freight office of the Cleveland, Painesville & Ashtabula road. He was connected with the Lake Shore & Michigan Southern for nearly 17 years, and during that period was Station Agent at Cleveland from September, 1867, to July, 1873, Assistant General Freight Agent for seven years, and General Freight Agent for nearly four years. He resigned this last position in 1885 and since that time has been Freight Traffic Manager of the Erie road.

—The appointment of Mr. George C. Smith, at present Assistant to the First Vice-President of the Missouri Pacific, to be Assistant General Manager of that road, is announced. Mr. Smith's duties will not be very different from those which he has performed for some time past. He has been connected with the Missouri Pacific since May, 1881. He was Secretary to Mr. H. M. Hoxie while he was General Manager of the International & Great Northern and Texas & Pacific roads and while he was First Vice-President of the Missouri Pacific until his death. He held the same position with Mr. S. H. Clark until November, 1886, when his title was changed to Assistant to the Vice-President. Before Mr. Hoxie became Vice-President of the Missouri Pacific Mr. Smith was Secretary to his predecessor, Mr. R. S. Hayes. He was Assistant Secretary of the company and Secretary of its branch lines between 1884 and September, 1885.

ELECTIONS AND APPOINTMENTS.

Boothbay.—The company was organized in Maine last week, with the election of C. H. Thomas Boyd, Alden Blossom, G. B. Kenniston, James C. Poole, K. H. Richards, and A. R. Nickerson as directors.

Camden, Watertown & Northern.—The first board of directors of this company is as follows: George A. Bayley, Alfred D. Remington, Byron B. Taggart, Samuel F. Bagg, George W. Knowlton, Joseph Mullin, Hiram F. Inglehart, Jene R. Stebbins, John F. Moffett, James L. Neuman, James B. Wise, Watertown, N. Y.; Austin Corbin, 192 Broadway, New York, and William Mather, Belleville, Jefferson Co., N. Y.

Central Pennsylvania, Eastern Extension.—The company has been incorporated by S. H. Hicks, Philadelphia, President; James A. Reilly, A. Schaffner, New York; S. B. Morgan, Hiram Dunkel, Jas. J. Higbee, C. D. Berger, Lorenzo Everett, Watsonstown, Pa., and Joseph R. Davis, Harrisburg, Pa.

Chicago & Eastern Illinois.—Mr. M. S. Connors, General Superintendent of the Peoria & Pekin Union, has been appointed Superintendent of Transportation of this road, with office at Danville, Ill. He succeeds Mr. T. W. Burrows, who has resigned on account of ill health.

Chicago, Fort Madison & Des Moines.—At the annual election of the road in Des Moines, Ia., Dec. 18, the following officers were elected: President, C. C. Wheeler; First Vice-President, Willard C. Block; Second Vice-

President, E. S. Conway; Secretary, W. P. Scott; Treasurer, E. C. Long; General Counsel, Jesse A. Baldwin.

Chicago, Milwaukee & St. Paul.—E. W. Jordan, who for 14 years has been connected with the road at Sioux City, Ia., has been appointed Division Freight and Passenger Agent, in charge of the Sioux City and Dakota divisions, with headquarters at Sioux City.

Danville & East Tennessee.—E. C. Manning has been appointed Assistant to the General Manager, with headquarters at Bristol, Tenn. His jurisdiction will extend 100 miles east of Bristol, Tenn., and all matters in his territory appertaining to rights of way should be referred to him.

D. Rodger has been appointed Assistant to the Chief Engineer, appointment to take effect Jan. 1, 1891. Mr. Rodger is the personal representative of the Chief Engineer in all matters appertaining to engineering and construction.

Delaware & Chesapeake.—The directors of the road have elected Col. Oswald Tilgman, of Easton, Md., a director in that road to fill a vacancy caused by the death of the late Col. Samuel Wetherell, of Oxford.

Delaware & Otsego.—At a meeting of the directors of the road, held at Rondout, N. Y., last week, the following officers were elected: Samuel G. Adams, New York City, President; Samuel G. Dimmick, Kingston, Vice-President; Richard B. Jones, Rondout, Treasurer.

Florida Southern.—W. B. Durham has been appointed Acting Superintendent of the road, with office at Palatka, Fla., vice Sherman Cnatt, who died Nov. 21.

Fort Worth & Denver City.—At the recent annual meeting the following board of directors was elected: G. M. Dodge, J. T. Granger and T. W. Pearsall, of New York; Morgan Jones, J. P. Smith, E. W. Taylor, J. M. Brown and W. F. Summerville, of Fort Worth, Tex., and W. T. Walters, of Baltimore.

Indianapolis, Decatur & Quincy.—The following have been named as directors of the new company: Hiram Hitchcock, Henry B. Hammond, Thomas B. Atkins, Stephen B. Thayer, Charles G. Allen and Horace Hotchkiss, of New York; John D. Probst, of Englewood, N. J.; Edward F. Leonard, of Peoria, Ill.; John F. Warner, of Decatur, Ill.; Robert B. Pierce and John R. Elder, of Indianapolis, Ind.

Louisville & Nashville.—William P. Pike, Master Mechanic of the Louisville & Nashville at Louisville, Ky., has been promoted to the position of Division Superintendent, in charge of the section which extends from Nashville to Louisville, 185 miles, vice P. T. Downs, resigned. J. G. Clifford, at present Master Mechanic of the Montgomery & Mobile and Mobile & New Orleans divisions, will succeed Mr. Pike.

Manistee Northern.—The following officers have been elected by this California road: President, F. F. Britton; Vice-President, I. A. Latta; Secretary, W. G. Hawley, and Treasurer, B. Griswold. The company has been organized by the California Redwood Land & Lumber Co. of San Jose, Cal.

Mobile & Ohio.—The office of Traffic Manager has been abolished. J. T. Poe, General Freight Agent, will perform all the duties heretofore performed by the Traffic Manager relating to freight traffic. His headquarters will be at St. Louis, Mo. G. W. King, General Passenger Agent, will report to and receive instructions from the General Superintendent or General Manager. J. M. Denyven has been appointed Assistant General Freight Agent of the company. Mr. Denyven has been chief clerk in Mr. Poe's office for several years.

New York, Lake Erie & Western.—At a meeting of the directors last week George H. Vaillant was elected second vice-president in charge of traffic. He succeeds E. B. Thomas, who became first vice-president at the annual meeting. Mr. Thomas retains control of the operating department, which he had charge of when second vice-president.

Oil City & New Castle.—The incorporators of this Pennsylvania road are: George E. Bartol, Philadelphia, President; Edmund D. Smith, Charles M. Lea, Henry C. Esling, and Samuel G. De Coursey, Philadelphia; W. S. Horsey and Price W. Jaremay, Media, Pa.

Rock Island & Peoria.—The officers elected by the directors at the annual meeting at Rock Island, Ill., Dec. 23, were as follows: President, R. R. Cable; Vice-President, A. Kimball; Secretary and Treasurer, H. B. Sudlow; Executive Committee: H. B. Sudlow, R. R. Cable and Thomas F. Withrow.

Somerset.—The annual meeting of the stockholders of the road was held in Oakland, Me., last week. The following officers were elected: John Ayer, President; A. R. Small, Treasurer and Clerk; Wm. M. Ayer, Superintendent; directors: F. W. Hill, Exeter; A. J. Libby, John Ayer, Oakland; B. P. J. Weston, Madison; R. W. Dunn, W. M. Dunn, and E. F. Webb, Waterville; Omar Clark, Carratunk; Stanton Day, Boston; Thomas Flint, San Juan, Cal.

Weatherford Mineral Wells & Northwestern.—The following officers have been elected: T. R. Stone, President; W. S. Stone, Vice-President; L. M. Fouts, General Manager and Chief Engineer; E. R. Standish, Auditor and Assistant Treasurer, and A. F. McKay, Superintendent. The office is at Weatherford, Tex.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Alabama Mineral.—The heavy work near Calera, Ala., which has been a great source of delay in the completion of the road from Shelby, was finished recently and the track has now been laid to Calera, on the Louisville & Nashville, and 40 miles from Sylacauga, the northern terminus of the extension. Trains will run across a temporary structure over the Coosa River, as the iron bridge over that stream will not be ready for traffic for two or three months.

Aransas Pass Terminal.—Most of the grading of this short road from Rockport on the mainland across Aransas Pass to Harbor Island, Tex., has been finished, and the piling across the channel is now in progress. The road will be about 10 miles long, and is being built by the Aransas Pass City & Improvement Co. to reach deep water on the Gulf of Mexico.

Baltimore & Ohio.—A press dispatch states that a corps of engineers surveying in the vicinity of Landenberg, about two miles above the Delaware state line, after

having completed a line from Oxford to the latter point to connect with the branch road running from Wilmington to Landenberg, Pa. The new branch will also connect with the Pomeroy & Newark Railroad at the same point.

The engineers of this company have recently made a survey from Brunswick (Berlin Junction), where new shops have been built, northeast to Middletown, a distance of about 12 miles.

California & Nevada.—This road has been sold by J. W. Smith, the President of the road and the owner of nearly all the capital stock, to Grant Bros., of Albuquerque, N. M., and other parties of Oakland, Cal., and the East. The road is now built for about 20 miles through Alameda and Contra Costa Counties, Cal., from Oakland to a point on San Pablo Creek. It is expected that the new owners will complete the line to Walnut Creek and possibly extend it to the San Joaquin River. The narrow gauge track is also to be changed to standard. The project for a ferry across San Francisco Bay from Oakland will also probably be carried out.

Camden, Watertown & Northern.—The articles of incorporation of this company were filed in New York last week. The road is projected by Austin Corbin as an extension of the Elmira, Cortland & Northern to the St. Lawrence River, and he had a survey made last summer. The new road is to extend from Camden, in Oneida County, N. Y., at the northern terminus of the Elmira, Cortland & Northern, thence north through the counties of Oneida, Oswego and Jefferson to the city of Watertown. The length of the road is 60 miles, and the capital stock is to be \$1,000,000.

Central Pennsylvania—Eastern Extension.—The company filed a charter at Harrisburg, Pa., last week to build a road 35 miles long from a point at or near White Deer, Union County, to a point at or near Washington Furnace, Clinton County, Pa. The capital stock is \$700,000. S. H. Hicks, Philadelphia, is President.

Cheyenne & Northern.—The extension of this road from Wendover to Fisher Junction, on the Fremont, Elkhorn & Missouri Valley, a short distance east of Douglas, has been opened for traffic. The extension is about 35 miles long and was built to the oil fields of Northern Wyoming.

Chicago & Eastern Illinois.—The committee appointed to secure the right of way through Shelby, Moultrie and Douglas counties, Illinois, for the extension of the St. Louis branch from Tuscola to Shelbyville, Ill., has completed its work, and on transfer to the railroad that part of the agreement which binds the city of Shelbyville is completed. It is the intention of the company on securing the right of way, to immediately begin the construction of the connecting link between its line and that of the Cleveland, Cincinnati, Chicago & St. Louis.

Chicago, Rock Island & Pacific.—The company announces that it will open its new line from South Omaha to Lincoln and Beatrice, Neb., on Jan. 4. The through passenger trains between Chicago and Denver will be run over it, and it is stated that the time will be four hours shorter than via the present lines through Kansas City. The new line is 54 miles long, but does not extend beyond Lincoln. The tracks of the Union Pacific are to be used between Lincoln and Beatrice.

Delaware River & Lancaster.—The road was opened on Dec. 17 from Kimberton to St. Peter's, Pa., and the work of grading from the latter point toward Lancaster is being pushed. Stations have been located under the following names: French Creek Junction, Pughtown, Wilson, Boraef, Roberts, Heistand, Coventryville, Knauerville, French Creek Falls and St. Peter's.

Flint & Pere Marquette.—The road has let the contract for the construction of a branch from Farwell, Mich., southeast four miles into an extensive tract of timber owned by E. Hall, of Bay City, and which will be lumbered this winter.

Fort Gibson, Tahlequah & Great Northern.—The company filed articles of incorporation in Arkansas this week. The road will commence at a point on the line of the St. Louis & San Francisco road near Rogers, in Benton County, and extend in a westerly direction to Bentonville; southwesterly through Siloam Springs to Tahlequah, Indian Territory; thence in a westerly direction to Fort Gibson, on Grand River, near where that river empties into the Arkansas River. The length of the road in Arkansas is thirty-five miles and in the Indian Nation about fifty miles. The road runs through the northwest of Arkansas and the Cherokee Nation. The capital stock is \$300,000. The Directors of the company are J. E. Crane, E. T. Smith, W. W. Brown of Siloam Springs, W. R. Freker of Rogers, and E. P. Watson of Bentonville.

Fremont, Elkhorn & Missouri Valley.—The track-laying from Deadwood to Custer, S. D., has made so much progress of late that it is believed the work will be completed, except for a few miles near Deadwood, by Dec. 27. A train will probably be run over the entire road from Edgemont Junction on that day, and it is stated that "gold, silver and tin spikes will be driven home" with the usual Western jubilation.

Georgia Legislature.—The Alabama Eastern and Brunswick & Northern have asked the legislature for charters.

Indianapolis, Decatur & Quincy.—This company, which is a reorganization of the Indianapolis, Decatur & Western, filed its articles of incorporation in Illinois last week. The charter provides for a line from the city of Indianapolis in a westerly direction, through the counties of Marion, Hendricks, Putnam, Parke and Vermillion in Indiana, and through the counties of Edgar, Douglass, Platt and Macon to the city of Decatur, and westwardly through the counties of Macon, Sangamon, Logan, Menard and Cass to Beardstown, on the Illinois River. The capital stock is \$2,400,000. The company will issue a first mortgage to cover the issue of \$4,000,000 of five per cent. bonds, and a second mortgage to secure an issue of \$2,400,000 of four per cent. bonds.

Kanawha & Elk River.—The company was incorporated in West Virginia, Dec. 22, with a capital of \$1,500,000. David Ward and others of Detroit are the incorporators. The road is projected to extend from the mouth of Kelley's Creek to Sutton, Braxton County.

Lexington Terminal.—The company will soon begin the extension of its track from its terminus at Lexington, Ga., to the rock quarries, one quarter of a mile distant. The contract for grading has been let.

Louisville, New Albany & Chicago.—Work was begun last week for an extension from Bainbridge, near Terre Haute, Ind., southeast to Brazil, Ind., a distance of about 20 miles. The work now being done is about eight miles north of Brazil and just south of Bridgeton, Parker County. About 175 teams are being employed. The road will be completed at once through Bridgeton and Carbon to Brazil and the extension may also be continued toward French Lick Spring and Evansville.

Mexican Central.—The company has commenced the construction of a line from Tula, on the main line, to Pachuca, about 45 miles northeast in the centre of a large mining district. The work was commenced in order to save to the company the franchise that it now holds. The work will not be pushed rapidly at present, but ultimately it is intended not only to build to Pachuca, but to continue the road through to Tampico.

Mexican Roads.—A concession has been obtained by the Hon. W. L. N. Wood, of London, Eng., for a road to extend from Viesca, a station on the Mexican International road, to Mapimi, on the Mexican Central.

Montgomery, Tuscaloosa & Memphis.—Contractors, Dean, Berry Bohmer & Co. have this week put a large force of hands and teams on the last section of eight miles of the road near Tuscaloosa, Ala. The entire line is now covered by grading forces and the contractors expect that the road will be completed and trains running through from Montgomery to Tuscaloosa by the middle of July.

New Roads.—The road being built by the Egypt Coal Mining Co., from its mines near Egypt, N. C., has been completed to near Sanford, near which point the line will connect with the Raleigh & Augusta. The distance is about nine miles.

A survey has been recently made for a proposed road through the northeastern part of Frederick County, Md., from Middletown, across the Cactin Mountains at Mt. Katalpa and through Frederick to Rocky Ridge on the Western Maryland road. The length of the line will be about 18 miles.

A charter has been obtained for the construction of a road from Summit Point, W. Va., to Berryville, Va. Col. William M. Clements, formerly General Manager of the Baltimore & Ohio road, is one of the incorporators.

Northern Pacific.—Several engineering parties are surveying in the northwestern part of Washington from Anacortes and other points on Puget Sound easterly along the Skagit River Valley for a branch of the Central Washington road, which it is proposed to extend across the state from the Columbia River. One party is surveying the line from Hamilton easterly to the Cascade Mountains.

Oil City & New Castle.—This company has been incorporated in Pennsylvania to build a road from Oil City, Venango County, Pa., to a point at or near Turners Station, on the Western New York & Pennsylvania road in Mercer County, Pa. The distance is 46 miles, and the capital stock is \$750,000. Geo. E. Bartol, Philadelphia, is President.

Oregonian.—The surveyors have been called in from the line of the proposed extension from Silverton to East Portland, Ore. There is very little probability that this extension will be built soon.

Pennsylvania.—Tracklaying on the Trenton cut-off road, between Morrisville and Downingtown, Pa., will shortly begin at Morrisville.

Philadelphia Belt Line.—The ordinance which this company has been endeavoring to secure from the Philadelphia councils for the last two years finally passed both branches last week with few votes against it, though some of the members who cast favorable votes had opposed it previous to its passage. The company proposes to build a line along the river front of Philadelphia, connecting all the wharves. It will be about 25 miles long and extend along the Delaware River around Point Breeze to the Schuylkill River. The company has agreed to vest the control of the road with the various commercial bodies of Philadelphia, if they desire to purchase the securities at par.

Philadelphia & Reading.—The terminal bill of this company, which gives it authority to extend its present line through the city of Philadelphia from its station at Ninth and Green streets, about 10 blocks nearer the business centre, to Twelfth and Market streets, by an elevated structure, to be used for both freight and passenger business, passed the Select and Common Councils of Philadelphia last week. The Mayor has not yet signed the ordinance, but it is not believed that he has any objection to it.

Pittsburgh, Beech Creek & Eastern.—The survey has been finished for this road from Butler to Clearfield, Pa., connecting at the former point with the Pittsburgh & Western. The charter was taken out one year ago. The president of the road is S. B. Dick, of Meadville, Pa.

Pittsburgh, Shenango & Lake Erie.—A short extension of this road from Greenville north to Hartstown in Crawford County, Pa., was opened for traffic last week. The branch is about 10 miles long.

Plymouth County.—A petition is to be presented to the next Massachusetts Legislature to incorporate this company with a capital of \$250,000. The proposed route is from a point on the Old Colony road in East Weymouth, thence through Weymouth, Hingham, Norwell, Hanover and Marshfield to a point upon the Old Colony near South Marshfield; from Hanover through Hanover, Pembroke and Marshfield, connecting there with the Old Colony, and also from the Marshfield station to a terminus at Brant Rock.

Pueblo, Gunnison & Pacific.—Several surveys were made by this company in Colorado in 1888, but the project has since dropped out of sight until a short time ago, when a party of engineers, under H. R. Holbrook, of Pueblo, Col., the Chief Engineer, began a survey east of Pueblo. The survey is being made from Pueblo down the Arkansas River, through Rocky Ford, to connect with the Burlington & Missouri at Oberlin, Kan. The line is on the south side of the river, and the surveyors are now on Adobe Creek, 70 miles east of Pueblo.

Rumford Falls & Buckfield.—Parker Spofford, of Buckport, Me., has just finished the location for the extension from Gilbertville westerly through Dixfield and Peru to Rumford Falls, Me., a distance of 15 miles. The site for the bridge across the Androscoggin River has not yet been decided upon. It will probably be at Dixfield, where the river is 750 ft. wide, shallow, and has a

gravel bottom. The grading on the extension will probably begin in April.

Savannah, Americus & Montgomery.—The standard gauging on the last section of this road, which has been in progress for some time west of Americus and Louvale, Ga., was finally completed last week. The track on the Montgomery extension has been laid as far as the Chattahoochee River, and standard gauge trains are now running to that point. The work on the bridge across the river is advancing rapidly, and as soon as it is ready to lay tracks across it that work will be commenced and completed through Alabama to Montgomery, as most of the grading through that state is nearly ready for the track.

Seattle, Spokane Falls, Boise & Salt Lake.—The charter of the Idaho division of this road was filed at Boise City, Idaho, Dec. 19. The capital stock is placed at \$20,000,000, of which about \$1,500,000 is reported subscribed. The papers filed only include such part of the road as will be within Idaho, beginning at a point near Lewiston on the northwest and running through the Seven Devils copper-mining country to Weiser, Payette, Boise, Mountain Home, to a point between the towns of Kelton and Kelso on the Utah line. Articles of incorporation have been filed in Utah for its continuance southeast to Salt Lake City and in the State of Washington.

South Carolina Legislature.—Bills have been introduced in the State Legislature to incorporate the following companies: Little Bluff, Ramont & Maxton; Charleston & Sea Island; Lockhart Shoals; Greenwood, Edgefield & Atlantic; Bennettsville & Gibson; Branchville & Bowman; Tennessee, Greenville & Port Royal; River and Seacoast; Pickens, Greenville & Paris Mountain.

Southern Pacific.—The bridge across the Tuolumne River in Stanislaus County, on the Oakdale extension, has been completed, and tracklaying was resumed last Monday and will be pushed forward as rapidly as the weather will permit until the line is completed. The track of the West Side branch is completed for over ten and a half miles south of Los Banos. Work is being pushed on this branch and the tracklaying will reach Firebaugh, Cal., 30 miles south of Los Banos, before the year is ended. The terminus of the branch is Armora, 58 miles further south. On the San Ramon Valley line the grading has progressed from Avon as far south as Concord.

A corp of engineers of the Morgan's Louisiana & Texas Railroad are surveying a line for a branch from Cheneyville, the present terminus of the road, to a point three miles west of Lamoine, La. The line will run down on the west side of Bayou Boeuf, and pass near four of the largest sugar mills in the parish.

Tacoma Eastern.—Six miles of the road has been graded from the head of Commencement Bay southward. This section is nearly ready for the commencement of tracklaying, and the projectors of the road expect to have it in operation early in February. The road is to be built to Tacoma, Wash.

Tennessee River, Ashville & Chattanooga.—The track on this road has been laid from a point on the Alabama Great Southern at Whitney, near the Coosa River, as far as Ashville, St. Clair County, Ala., and the work is now in progress from the latter point toward the Chattanooga River.

Union Pacific.—The Maxwell branch, of the New Mexico district of the Union Pacific, has been extended from Catskill to Vasquez, N. Mex., 40 miles from Trinidad. The stations between Trinidad and Vasquez are Sopris, Long's Junction, Martinsen, Pels, Catskill, McAlpine, Blethen and Kelleyville.

Weatherford, Mineral Wells & Northwestern.—The tracklaying on this Texas road reached Mineral Wells, 23 miles from Weatherford, last week, and freight trains begin running Dec. 27. The principal business for the present will be transporting coal from the mines near Mineral Wells, and which are owned by the company that built the railroad. All the equipment has arrived, and passenger trains will be put on Jan. 1. The contractors for the road are the Weatherford Construction Co., who still have about 100 men and 50 teams at work.

West Virginia & Pittsburgh.—The Weston & Elk River Branch, which is being built from Weston south to Sutton, near Braxton Court House, has reached a point just north of Burnsville, about 24 miles south of Weston. The entire extension will be about 46 miles long.

Wrightsville & Tennille.—A second survey for the proposed extension of this line from Dublin southeast to Abbeville in Wilcox County, Ga., has been completed. To Eastman, a few miles north of the latter point. The extension will be about 40 miles long, and it is expected that the contracts will be let this winter and the grading begun in the spring.

GENERAL RAILROAD NEWS.

Dayton, Ft. Wayne & Chicago.—In the case of Charles J. Heinschelm and others against the road, the plaintiff recently filed a motion to set aside the appraisal of \$2,180,000 as being too low, also claiming that the mortgages are not on the entire road, that the decree is based upon claims not yet proven valid, and that the appraisal is not warranted by law. The motion was overruled.

Illinois Central.—The income from traffic for the five months ending Nov. 30, 1890 and 1889 (November, 1890, estimated), is shown in the following table:

	1890.	1889.	Inc. or dec.
Miles operated.....	2,275	2,275	
Gross earnings.....	\$6,506,061	\$6,402,772	I. \$103,289
Oper. expen. & taxes.....	4,118,178	3,684,496	I. 733,682
Net earn.....	\$2,087,883	\$2,718,276	D. \$630,393

The Dubuque & Sioux City company reports its gross and net income for the five months ending Nov. 30, as follows:

	D. & S. C.	C. F. & M.	Both roads.
	1890.	1889.	1890.
Miles.....	524	524	600
Gross earn.....	1,007,239	848,426	1,053,728
Oper. expen. & taxes...	746,006	579,970	805,751
Net earn.....	261,233	268,456	247,977

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals) and

net earnings of the road and its auxiliary lines for the month of October, 1890, were as follows:

	Gross earn.	Oper. expen.	Net earn.	Oper. mileage.
Roads owned and controlled.....	\$3,197,595	\$1,988,051	\$1,209,543	6,527
Roads jointly owned with other companies:				
Atchison's one-half.....	161,287	165,042	def. 3,754	582
Total Atchison system.....	\$3,358,882	\$2,153,093	\$1,205,789	7,109
St. Louis & San Francisco:				
Roads owned and controlled.....	\$711,323	\$351,745	\$359,578	1,329
Roads jointly owned with Atchison:				
Frisco Co's one-half.....	157,332	158,471	def. 1,139	526
Total Frisco system.....	\$868,655.53	\$510,216	\$358,439	1,855
Aggregate both systems.....	\$4,227,537	\$2,663,309	\$1,564,228	8,964

The comparative statement of all lines is as follows:

	Gross earn.	Net earn.	Per mile.	Gross earn.	Net earn.	Per mile.
Atchison sys-tem:						
October, 1890.....	\$3,358,882	\$1,205,789	\$472	\$169	7,109	
October, 1889.....	3,040,758	1,299,514	427	182	7,112	
Inc. or dec.....	I. 318,124	D. 93,725	I. 44	D. 13	D. 2	
Frisco sys-tem:						
October, 1890.....	868,656	358,439	468	193	1,855	
October, 1889.....	786,949	376,076	424	202	1,855	
Inc. or dec.....	I. 81,706	D. 17,637	I. 44	D. 9		
Aggregated gen-eral system:						
October, 1890.....	4,227,538	1,564,228	471	174	8,964	
October, 1889.....	3,827,707	1,675,590	426	186	8,967	
October, 1890.....	I. 399,831	D. 111,362	I. 44	D. 12	D. 2	

Evansville & Richmond.—The company has filed for record in Bartholomew County a mortgage for \$1,000,000 on the Eastern Division of the road from Seymour to Richmond, Ind. The mortgage is in favor of the New York Security Trust Co. and Josephus Collett, of Terre Haute.

Lake Shore & Michigan Southern.—Following is a statement showing the result of the business for the year 1890, December partly estimated, compared with 1889:

	1890.	1889.
Gross earnings.....	\$20,874,200	\$19,487,197
Oper. expen. and taxes.....	11,189,200	12,847,452
Per cent.....	(67.37)	(65.93)
Net earnings.....	\$6,685,000	\$6,639,745
Int., rentals and div.....	3,375,000	3,423,469
Balance.....	\$3,310,000	\$3,216,276
Amount of dividends.....	2,967,990	2,473,325
Surplus.....	\$342,010	\$742,951

The increase in gross earnings was \$1,387,003, or 7.12 per cent.; in expenses, \$1,663,252, or 10.45 per cent.; in net earnings, \$45,254, or 0.68 per cent. The decrease in interest and rentals was \$48,469, or 1.42 per cent.

Gross earnings for the year are the largest in the history of the company. Expenses include all expenses for the year. Nothing has been charged to construction or equipment since 1883. The outlays in 1890 for new equipment (in excess of maintenance and rentals) was \$550,000; and for second track, new sidings, heavier iron bridges, and reduction of grades, \$1,130,000, making an aggregate of \$1,680,000. The funded debt has been decreased during the year \$250,000 by the operation of the sinking fund.

Michigan Central.—The following statement of the business for the last year compared with that of 1889, December, 1890, being partly estimated:

	1890.	1889.	Inc. or Dec.
Gross earnings.....	\$11,340,000	\$13,787,000	I. \$2,447,000
Oper. expen. and taxes.....	10,511,000	9,835,000	I. 676,000
Per cent.....	(73.32)	(71.77)	I. (1.55)
Net earn.....	\$3,829,000	\$3,952,000	D. \$123,000
Interest & rentals.....	2,454,000	2,512,000	D. 58,000
Balance.....	\$1,375,000	\$1,380,000	D. 5,000
Propor. to Can. Southn.....	384,000	407,000	D. 23,000
Sur. to Mich. Cent.....	\$988,000	\$973,000	I. \$15,000
Inc. from investments.....	51,000	39,000	I. 12,000
Net income.....	\$1,039,000	\$1,012,000	I. \$27,000

New York Central & Hudson River.—The following statement shows the earnings and expenses of the company and its leased lines for the quarter and the half year to Dec. 31 (December, 1890, estimated):

<i>Three months to Dec. 31.</i>	1890.	1889.	Inc. or Dec.
Gross earnings.....	\$ 9,528,500	\$ 9,531,252	D. \$ 2,752
Operating expenses.....	6,236,104	6,219,348	I. 16,756
Net earnings.....	\$ 3,292,396	\$3,311,904	D. \$19,508
Fixed charges.....	2,114,400	1,965,420	I. 148,980
Profit.....	\$1,177,996	\$1,346,484	D. \$168,488
Dividend.....	894,283	894,283	
Surplus.....	\$283,713	\$452,201	D. \$168,488
<i>Six months to Dec 31.</i>			
Gross earn.....	\$18,592,735	\$19,276,454	D. \$683,719
Oper. expen.....	12,473,626	12,592,530	D. 118,904
Net earn.....	\$6,119,109	\$6,683,924	D. \$564,815
Fixed charges.....	4,196,400	3,943,701	I. 252,699
Profit.....	\$1,922,709	\$2,740,223	D. \$817,514
Dividend.....	1,788,566	2,235,708	D. 447,142
Surplus.....	\$134,143	\$504,515	D. \$370,372

Norfolk Southern.—In the United States District Court at Norfolk, Va., an amended decree has been entered concerning the sale of the road. The road is to be sold at Elizabeth City, Jan. 15, by commissioners. No bid for a sum less than \$500,000 is to be entertained.

Pacific Short Line.—Judge Rinor of the United States Court at Cheyenne, Wyo., has appointed W. E. Guthrie Receiver of the Pacific Short Line property in Wyoming. The application was made by the Wyoming Improvement Co., of New York City. This is the construction company, and it claims to have expended \$2,000,000 in building the road from Sioux City to O'Neil, Neb., 120 miles.

Texas Trunk.—J. W. Smith, of Burlington, Ia., has petitioned the United States Circuit Court in Texas to appoint a receiver for the road, which is a narrow gauge line extending from Houston to Sealey, Tex., 53 miles.

In the petition it is stated that the company cannot hope to pay the interest on its bonds, that the operating expenses are not earned and the deficit is becoming greater each month. Over \$20,000 is now owed for wages to employees and for material. The case will be argued in New Orleans Jan. 6. The road has only been out of the Receiver's control a few months.

Union Pacific.—The mayor of Lincoln Centre, Kan., has filed a complaint with the state Railroad Commissioners against the company for discontinuing the passenger train service on the Union Pacific, Lincoln & Colorado branch of that road, which runs from Salina to Colby, Kan. The only passenger service the line now has is a mixed train which makes one trip a day. The line is 225 miles long and parallels the main line between Kansas City and Denver. It was built in 1887 and 1888.

Western & Atlantic.—The Governor of Georgia has appointed a commission to hear the case of the lessees of the road against the state. The members of the commission are: J. L. Warren and George A. Mercer, of Savannah; J. C. Black, of Augusta; N. J. Hammond, of Atlanta; G. Gunby Jordan, Columbus; Walter B. Hill, Dan G. Hughes, Macon, and S. D. McCutchen, Dalton. A report will not be made until next June. The claim made by the old lessees is for a sum over \$700,000, which they claim should be paid by the state for rolling stock and improvements made in the road by the lessees during the 20 years that it has been operated by them. The new lessees, the Nashville, Chattanooga & St. Louis, will take possession of the road Dec. 27, in accordance with the terms of the lease.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 24, 1890.

Interviews with the presidents who attended the conference at New York bring out nothing beyond what has already been published. They express themselves as satisfied with the preliminary work done. It is not probable that any further meeting will occur before the second week in January, or later.

The Western Freight Association has finally arranged for a modification of the Fowler & Son contract with the Alton by substituting 22 cents in place of 18 cents as the maximum on packing house products. This will enable the rate on live hogs to be retained at the 22 cent rate and avoid the reduction through the entire territory of the association which has seemed for the past two months to be unavoidable. Taking effect Jan. 1, the rates on live hogs and packing house products are to be 22 cents per 100 lbs. from Missouri River points to Chicago, and 15 cents from the same points to Mississippi River points. Fifth class rates are to be made on these commodities from points in Iowa and Missouri to Chicago, with the Missouri River rate as a maximum. The report of the committee says "an agreement has been reached whereby Fowler & Son, of Kansas City, assent to a modification, temporarily, of the contract held by that firm. . . . Such assent may be regarded as experimental, being given to avert the establishment of a rate of 8 cents per 100 lbs. on shipments of live hogs from Southwestern Missouri River points to St. Louis."

Temporary rates on grain from Minnesota and Dakota to Chicago are to be made Jan. 1 on a basis of 12½ cents per 100 lbs. St. Paul and Minneapolis to Chicago, and to continue until Feb. 1. In the meantime an agreement is expected to be reached, that will be satisfactory to all lines, for a division on the traffic. The "Soo" line has agreed to advance its rates of flour to correspond.

It is reported that Attorney General Miller has ordered the retirement of Attorney Lamberton from the prosecution of the cases against the indicted Burlington officials, on the ground that he is the attorney for Thomas Lowry, a prominent shipper of Lincoln, Neb., who has suits pending against the Burlington involving a large amount.

A preliminary meeting was held here yesterday by the officials of the Belt line and other roads for the purpose of discussing plans for the movement of passenger traffic to and from the World's Fair grounds. General Manager Thomas, of the Western Indiana Belt line, favors the construction of some kind of a circular track with suitable connections with the terminal lines, and sufficient side track room within the circle to admit of trains being brought in, unloaded and returned to their respective roads, loaded, without necessitating the use of "Y" tracks.

The Western Freight Association has voted in connection with the re-establishment of the 75 cent scale between Chicago and Missouri River points Jan. 1, to re-establish the rates established by the Iowa Board of Railroad Commissioners, in lieu of the modified Iowa distance tariff rates now in force.

Chairman Finley, of the Western Passenger Association, has fined the Wabash \$100, plus an amount equal to the tariff rates, on a block of tickets from St. Louis to Chicago, which were placed on the market last month by that company at less than the established rates. Complaint was made by the Alton. The Wabash admitted the charge, but sought to justify its action on the ground that it was forced to meet rates made at that point at the time by other roads. Chairman Finley denied the right of the road to do so without the authorization of the association.

The date after which no commissions will be allowed to any fast freight line, or others, west of the Mississippi River, in accordance with the recent vote of the Western Freight Association, has been fixed as Feb. 10.

The Atchison opened its "Red Line" between Chicago and St. Louis Dec. 21. Two passenger trains each way daily are to be run.

The Rock Island will open its new Denver line via Omaha, Lincoln and Beatrice, Jan. 4. This line shortens the Rock Island's distance between the two points 40 miles, and the running time nearly three hours.

Beginning Dec. 28, the Chicago, Milwaukee & St. Paul will extend the run of its Chicago-Council Bluffs trains to Omaha, using the Union Pacific bridge to cross the Missouri River.

Traffic Notes.

The South Carolina Railroad has withdrawn all ten-day round trip tickets, together with Saturday excursion tickets. The manipulations of scalpers are said to be the principal cause for this action.

The Boston & Maine has put into force another 75 cent. reduction in second-class passenger fares from Boston to Chicago. This reduction makes the drop in fares since the contention began \$3, or from \$16.25 to \$13.25.

The roads in Ohio, Indiana and Illinois complain that the trunk lines are using all available cars for carrying grain east from Buffalo (which was brought there by the boats), thus producing a decided scarcity of cars on the Western lines.

The Chicago, Rock Island & Pacific has made a blanket rate of 10 cents per 100 lbs. on corn and oats westward to stations in Nebraska and Kansas, the same being an emergency rate on account of the short crops in the western part of those States.

The Pittsburgh Car Service Association has extended its territory from the 50-mile limit at the time of its formation about a year ago to 100 miles. This takes in Wheeling, W. Va., and several important towns in Ohio on the Baltimore & Ohio and Pennsylvania lines.

Figures are published showing that the passenger traffic to and from the Broad Street Station of the Pennsylvania at Philadelphia has nearly doubled in six years. The traffic of the New York division has more than doubled, the number of passengers to and from Broad street in 1884 being 2,542,862 and in 1889 5,648,831.

The Kansas farmers announce that they have begun a movement to force a sweeping reduction in grain rates from points in that state. The Interstate Commerce Commission is to be appealed to, and evidence is being accumulated by a committee of farmers to be used in complaint against the Rock Island, the Atchison and the Missouri Pacific.

No more reduced passenger rates on the certificate plan will be given by the lines in the Michigan Association. Hereafter parties desiring such rates will have to take advantage of the party rate allowed to 10 or more people, but they will all have to travel on one ticket from the starting point to destination and back again. This takes effect Jan. 1, 1891.

Manager J. E. Challenger, of the Philadelphia Car Service Association, reports for November 52,617 cars handled, and average detention 1.46 days. Only 3,244 cars were delayed over 48 hours, and the detention in these cases was only 2.56 days. The association has been in operation three months, and in this time 157,320 cars have been handled. Of these 87,899 were on the Pennsylvania and affiliated roads, 59,688 on the Reading, 5,579 on the Wilmington & Northern and 4,354 on the Baltimore & Ohio.

Uniform Classification.

The Iowa Railroad Commission held a conference last week with the sub-committee of the Uniform Classification Committee, consisting of J. W. Midgley, J. M. Johnson, and H. R. McCullough. The desire of the Uniform Classification Committee to secure the adoption of the classification in every state was presented by Chairman Midgley, and doubtful points were discussed. Spencer Smith, on behalf of the Commissioners expressed their position on the question, which has been in direct line with the uniform classification. No definite action will be taken by the Board before Jan. 1.

It is said that Chairman Midgley is much surprised and chagrined at the failure of the trunk lines to adopt the uniform classification. "The representatives of that body on the committee were enthusiastic in its favor, and I have been told by prominent trunk line representatives within a few weeks that the Association would undoubtedly adopt it. I shall not be surprised if the Commission orders the adoption of the uniform classification as it stands, and if the trunk lines ignore such an order it is probable that an act of Congress will make them regret it."

Illinois Freight Rates.

The Railroad and Warehouse Commissioners have promulgated their order reclassifying the railroads doing business in Illinois, which was adopted on Dec. 12. Under this order, which will take effect on Jan. 1, the following railroads are transferred from Class B to Class A: Chicago & Eastern Illinois, Chicago & Iowa, Lake Erie & Western, Louisville & Nashville, Louisville, New Albany & Chicago, Peoria & Pekin Union, Pittsburgh, Cincinnati, Chicago & St. Louis, Rock Island & Peoria, Terre Haute & Indianapolis and the Wabash. The effect of this change will be to make the roads named subject to the lower schedule of maximum rates, applicable to the railroads doing business in Illinois.

International Traffic.

Representative Burton, of Ohio, introduced in Congress, on Dec. 23, a bill to amend the Interstate Commerce act by adding a section relative to railroads doing business partly in the United States and partly in adjacent foreign countries. It requires such a company to obtain from the Interstate Commerce Commission a license to engage in such business. The application for license is to contain a stipulation that the company will obey and conform to the provisions of the act to regulate Interstate Commerce; the Commission is given jurisdiction to investigate any alleged violation of the act by any company to which such license may issue; and if, upon investigation, it is found the law has been violated, the Commission may suspend the license three months for the first offense and six for the second. The Commission when it suspends the license of a company is to notify the Secretary of the Treasury, who is to issue an order to the proper customs officers, directing them to prevent the passage of cars, etc., at their ports.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Dec. 13, amounted to 80,796 tons, against 77,386 tons during the preceding week, an increase of 3,410 tons, and against 101,805 tons during the corresponding week of 1889, a decrease of 21,021 tons. The proportions carried by each road were:

	Tons.	P. c.
Michigan Central.....	11,194	13.9
Wabash.....	4,609	5.8
Lake Shore & Michigan South.....	13,471	16.7
Pitts., Ft. Wayne & Chicago.....	11,924	14.8
Chicago, St. Louis & Pitts.....	9,819	12.1
Baltimore & Ohio.....	5,330	6.8
Chicago & Grand Trunk.....	8,160	10.1
New York, Chic. & St. Louis.....	9,417	11.7
Chicago & Erie.....	6,582	8.1
Total.....	80,796	100.0

Of the above shipments 9,131 tons were flour, 31,123 tons grain, 6,277 tons millstuffs, 1,146 tons cured meats, 6,091 tons lard, 8,633 tons dressed beef, 937 tons butter, 1,955 tons hides, 123 tons wool, and 6,572 tons lumber. The three Vanderbilt lines together carried 42.3 per cent. while the two Pennsylvania lines carried 26.9 per cent. For the week ending Dec. 20 the shipments aggregated 80,797 tons, against 80,796 for the week previous, and against 111,832 for the same period last year. It is said that the falling off, as compared with last year, is due to a scarcity of cars.

3
3
3
e
r
d
d
d
e